# Chapman Lake Aquatic Vegetation Management Plan Update 2006

**Kosciusko County, Indiana**

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Prepared for:

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**CHAPMAN LAKE AQUATIC PLANT MANAGMEENT PLAN UPDATE**
**KOSCIUSKO COUNTY, INDIANA**

## EXECUTIVE SUMMARY

This document is intended to update the 2004 Aquatic Plant Management Plan and build on the 2005 update for Big and Little Chapman Lakes, Kosciusko County, Indiana.

The following update specifically addresses the results of the aquatic plant chemical treatments conducted during the 2006 season and compares the results with variations in the plant communities at both lakes over a period of the past three growing seasons. The Aquatic Plant Management Plan of November 2004 should be consulted for complete information regarding aquatic plant management at Chapman Lakes. Likewise the 2005 update should be reviewed for specifics of the 2005 sampling results and treatment information.

In 2006, the only method of control was chemical in nature and was intended to target Eurasian watermilfoil and curly-leaf pondweed. Both species are exotic to Indiana lakes. On May 24, 2006, Aquatic Control Inc. (Seymour, Indiana) treated approximately 14 acres of Eurasian watermilfoil and 10 acres of curly-leaf pondweed within the two lakes. Two separate treatments occurred targeting two different species. Due to differences in acreage treated and dosage utilized, treatment methodologies differed for the two target species. A low rate of Aquathol K herbicide was used to control curly-leaf pondweed while not harming native pondweeds or other aquatic species. Conversely, since a relatively large area was treated selectively, Eurasian watermilfoil control herbicide (Renovate 3) was applied at a rate of approximately 1.25 ppm or roughly 4-5 gallons per acre.

A Tier II survey was conducted before and after chemical treatment occurred to determine the nature of the plant community and effectiveness of treatment. In comparing 2006 pre- and post-treatment Tier II survey data, it was found that the relative density and abundance of Eurasian watermilfoil and curly-leaf pondweed decreased in almost all cases (See Appendix B; Figure 1 and Appendix C; Figure 1-2). The exception to this trend was an increase in relative density of Eurasian watermilfoil in Little Chapman Lake, which increased slightly from 0.24 to 0.30 (See Appendix B; Figure 2). A follow-up inspection was completed by the applicator and the Association. It was found that the treatment of the 2 acres in the northern part of Little Chapman Lake had not proved as effective as other treated areas. The applicator suspected that since the area was relatively small drift may have been a factor and recommended that potential future treatment of areas less than 5 acres or deeper than 6 feet be treated using 2,4-D or Renovate in their granular forms.

JFNew's review of Tier II surveys from 2004-2006 indicate that herbicidal treatment of Eurasian watermilfoil and curly-leaf pondweed are proving successful in reducing both the abundance and relative density of these two exotic species in both Big and Little Chapman Lakes in most cases. In comparing pre-treatment Tier II survey data from 2005 and 2006, data indicate that Eurasian watermilfoil populations in both Big and Little Chapman Lakes and curly-leaf pondweed in Little Chapman Lake decreased (See Appendix B; Figures 1-4 and Appendix C; Figures 1-2). Curly-leaf pondweed populations in Big Chapman Lake remained largely unchanged in both site abundance and relative density from 2005 to 2006. One possible explanation for this is that curly-leaf pondweed in Big Chapman Lake has historically undergone less rigorous treatment than curly-leaf

pondweed in Little Chapman Lake; a more rigorous investigation would be needed to confirm this however. Another possible explanation for the persistence of the curly-leaf pondweed in Big Chapman Lake is that water temperatures during treatment on May 24, 2006 were greater than the ideal water temperature for treating curly-leaf pondweed (40-50 ºF). Treatment at cooler temperatures has greater long-term potential for success since control is implemented before turion development, thus limiting next season's growth potential (Nate Long, Aquatic Control Inc., personal communication).

The effects of the treatment on the native aquatic plant community are unclear. Comparing the 2006 pre- and post-treatment Tier II survey metrics indicates that the quality of the native aquatic plant community in both lakes decreased following treatment. The native rake diversity (SDI), native species richness and site species native diversity all decreased following treatment. (See Tables 6 and 9 for more information.) The number of native plant species found in Little Chapman Lake did not change following treatment. However, the number of native plant species found in Big Chapman Lake decreased from 19 to 15.

Additional items including a Tier I Survey; a public meeting; and a meeting between the contractor, LARE program staff, the district fisheries biologist, and a representative from the CLCA, also occurred in concert with this aquatic plant management plan update. The details of these are not repeated here, but were utilized to generate recommendations as follows:

1. Early season assessment of curly-leaf pondweed populations to determine if treatment is necessary. Assessment and treatment should occur when water temperatures are at 30 to 40º.
2. Assessment of channels along Little Chapman Lake's northern shoreline, between the lakes, and along the eastern and northern shorelines of Big Chapman Lake and within Nellie's Bay is also necessary. These areas are thought to act as nurseries for Eurasian watermilfoil. Treatment of these areas should result in less reintroduction of Eurasian watermilfoil from the channels into the main body of the lakes.
3. Treatment of approximately 25 acres of Eurasian watermilfoil throughout the Chapman Lakes. Areas are identified in the following sections, but should be confirmed prior to treatment occurring in 2007.
4. Continue pre- and post-treatment assessments to determine how the aquatic plant community within the Chapman Lakes changes over time.

## ACKNOWLEDGEMENTS

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# CHAPMAN LAKES AQUATIC PLANT MANAGEMENT PLAN UPDATE
# KOSCIUSKO COUNTY, INDIANA

## 1.0 Introduction

This report serves as an update to the 2004 Chapman Lake Aquatic Management Plan. The update will serve as a tool to track changes in the vegetation community, to adjust the action plan as needed, and to maintain eligibility for additional LARE funds. Items covered include a review of details of the 2006 vegetation control efforts; summer Tier I and spring and summer tier II results from the 2006 season; a comparison of Tier II results from 2004, 2005, and 2006 from both IDNR and JFNew; a recap from the public meeting; and a discussion of potential management implications of the results. The plan update was funded by the Indiana Department of Natural Resources (IDNR) Lake and River Enhancement Program (LARE) and the Chapman Lake Foundation (CLF). This is the third year that that the Chapman Lakes have been involved in aquatic plant management planning through the LARE program.

During the 2006 growing season the following actions were taken.

- May 22, 2006; Tier II aquatic plant survey completed on both lakes.
- May 24, 2006; 14 acres of Eurasian watermilfoil and 10 acres of curly-leaf pondweed treated on both lakes.
- July 18-19, 2006; Tier I and Tier II aquatic plant surveys completed on both lakes.
- July 8, 2006; Public meeting to discuss initial aquatic plant survey results and treatment.
- November 2, 2006; Meeting between the CLF, JFNew, Aquatic Control Inc., and IDNR to discuss 2007 treatment options

## 2.0 Watershed and Lake Characteristics

Lake levels have returned to normal following the water level control structure repairs in the summer of 2005. See Chapman Lakes Aquatic Vegetation Management Plan (CLF, 2004) for additional watershed and lake characteristic details.

## 3.0 Lake Uses

See Chapman Lakes Aquatic Vegetation Management Plan (CLF, 2004).

## 4.0 Fisheries

Pearson (2005a; 2005b) noted small growth rates for bluegill and largemouth bass within both Big and Little Chapman Lakes. The reason for these slow growth rates are being examined by the IDNR at this time. There are no suggestions that any sport fish within the lakes are negatively impacted by aquatic herbicide applications that occurred in the two previous summers. Continued examination of the connection between zooplankton, water quality, plant communities, and fish community structure is necessary to determine if any adverse effects should be expected in the future (Pearson, 2005a; Pearson, 2005b). At this time, it is anticipated that the recommended treatment program can continue with little negative impact on the sport fish community. Additionally, it should be noted that the DNR is currently monitoring Big and Little Chapman Lakes as "control lakes" for comparison to lakes treated with fluoridone and to better understand factors that limit bluegill growth.

## 5.0 Problem Statement

Previous aquatic plant assessments identified the presence of Eurasian watermilfoil and curly-leaf pondweed as the two primary exotic nuisance species located within the Chapman Lakes. These two species continue to be problematic throughout the areas previously identified. However, the presence of Eurasian watermilfoil in Nellie's Bay and along Big Chapman Lake's eastern shoreline is a new development in the past year. These areas are subject to infestation due to fragments of Eurasian watermilfoil being carried to these locations by water currents. The fragments then take root in these areas due to both locations being shallow coupled with relatively good water clarity. Additional areas of concern that have not previously been targeted by the CLCA or CLF treatment efforts are the channels along the northern shoreline of Little Chapman Lake, channels between the two lakes, and channels along Big Chapman Lake's southern and eastern shorelines and within Nellie's Bay. These areas serve as nurseries for both Eurasian watermilfoil and curly-leaf pondweed. These areas should be targeted for treatment of exotic species in order to reduce the likelihood of the reintroduction of these species from the channels.

## 6.0 Vegetation Management Goals and Objectives

The CLCA and the CLF identified four management goals during the development of their initial aquatic plant management plan (CLF, 2004). These goals fit into the three goals developed by the IDNR for aquatic plant communities within Indiana lakes. As none of the goals or objectives changed based on this year's assessments; the goals are not restated here. Please refer to the Chapman Lakes Aquatic Plant Management Plan for more information on their goals (CLF, 2004).

## 7.0 Plant Management History

On May 24, 2006, Aquatic Control Inc. treated a total of 14 acres of Eurasian watermilfoil and 10 acres of curly-leaf pondweed. Treatment occurred during sunny conditions (approximately 70ºF) with a light wind. Figure 1 indicates the specific locations, plant species targeted, and size of area targeted during the aforementioned herbicide application. For selective Eurasian watermilfoil control, roughly 1.25 ppm of Renovate 3 herbicide (approximately 4-5 gallons per acre depending on the depth and size of the area) was applied. This higher than normal level was used due to the small size of the treatment area. Often an herbicide can be applied at a lighter rate when treating big areas. For curly-leaf pondweed control 1.0 ppm of Aquathol K herbicide was used (applied at a rate of approximately 3 gallons per acre). This low rate was used to control curly-leaf pondweed, which is more sensitive to Aquathol, while not killing native pondweeds. For both treatments, herbicide was applied by making narrow passes through the treatment area.

As of June 16, 2006, observers around the Chapman Lakes did not feel that adequate treatment occurred throughout the areas treated for Eurasian watermilfoil. However by June 21, 2006, more than a 50% die off was observed within Nellie's Bay, while slightly less than 50% die off occurred in the other two Eurasian watermilfoil treatment areas. By July 30, 2006, more than 90% die off was observed in all of the three Eurasian watermilfoil treatment areas. Aquatic Control biologists' believe that the slow response rate was due to the treatment of small areas (5 acres or less) using liquid herbicide. Because liquid herbicide is applied into the water and subsequently distributes throughout the water column, it is difficult to maintain a high concentration for a long period of time. All aquatic herbicides are based on maintaining a required concentration for a specified time period, typically 2 to 24 hours. Renovate and 2,4-D both require maintaining the recommended treatment concentration for 24 hours. When treating larger areas, the herbicide still distributes throughout the water column; however, herbicide is typically moved into and out of the treatment areas through wind and wave action. When the areas are small- like those treated in Chapman Lake-

the herbicide drifts off into untreated areas, thereby lowering the herbicide concentration over time. This means that the requisite concentration is not maintained for an adequate time period. These biologists' recommend that future treatments of Eurasian watermilfoil in area less than 5 acres use granular Renovate or granular 2,4-D.

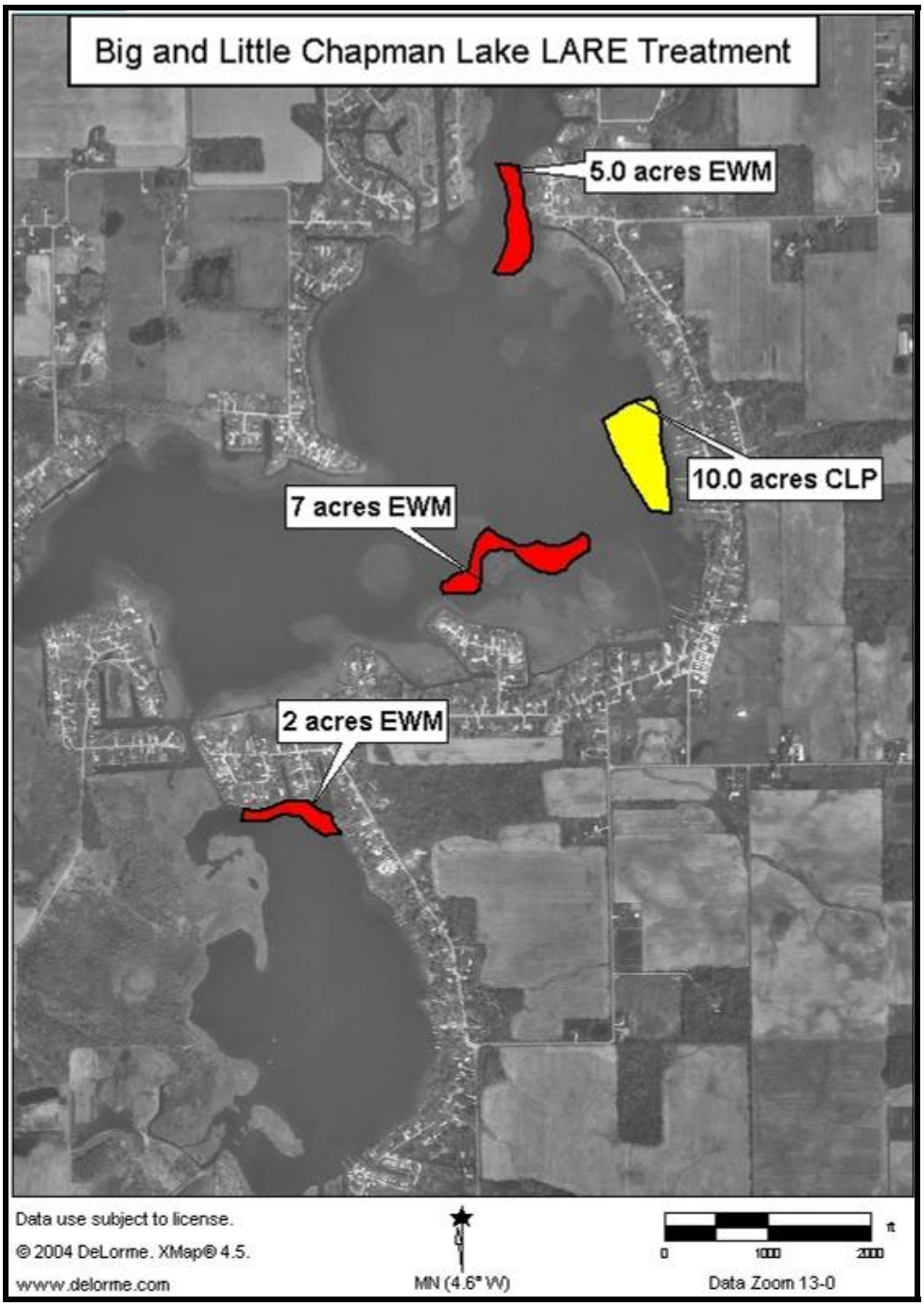


**Figure 1. Eurasian watermilfoil (EWM) and curly-leaf pondweed (CLP) treatment areas located on Big and Little Chapman Lakes. Aquatic Control Inc. completed treatment on May 24, 2006.**

With regards to curly-leaf pondweed treatment, adequate die off (90%) was observed within 2 weeks of treatment. However, it should be noted that treatment of curly-leaf pondweed in July likely resulted in short-term improvement only. Future treatment should occur earlier in the spring when the water temperatures are 30-40 ºF.

Additional treatment occurred on the Chapman Lakes that was not funded by the DNR LARE program. All data included herein are from permits filed with the DNR. In 2006, roughly 30 acres of Big Chapman Lake were treated for Eurasian watermilfoil, curly-leaf pondweed, algae, coontail, eel grass, sago pondweed, chara, flat-stem pondweed, elodea, and filamentous algae. In total, 22 sites were treated by three applicators. The applicators used Reward, Aquathol K, copper sulfate, Nautique, Hydrothol 191, Cygnet Plus, and 2,4-D. Treatment occurred between mid-May and mid-August. Most of the treatment areas occurred along transects that paralleled the shoreline at a distance of 50 to 100 feet.

In 2006, 7.07 acres of Little Chapman Lake were treated for Eurasian watermilfoil, curly-leaf pondweed, algae, coontail, and white water lily using funding sources other than LARE. In total, eight sites were treated by four applicators. Treatments occurred from mid-May to mid-July. The applicators used Renovate, Reward, Aquathol K, copper sulfate, and 2,4-D. Six of the eight applications were reported to be transects that paralleled the shoreline at a distance between 30 and 75 feet. The other two permits did not indicate the distance from the shoreline upon which treatment occurred.

## 8.0 Aquatic Plant Community Characterization

### 8.1 Methods

JFNew surveyed Big and Little Chapman Lakes on May 22 and July 18 and 19, 2006 according to the Indiana Department of Natural Resources sampling protocols (IDNR, 2006a; IDNR, 2006b). JFNew examined the entire littoral zone of the lake during each of the three assessments. The only Tier I survey that was completed on the Chapman Lakes occurred on July 19, 2006. As defined in the Tier I protocol, the lake's littoral zone was estimated to be approximately three times the lake's Secchi disk depth. This estimate approximates the 1% light level, or the level at which light penetration into the water column is sufficient to support plant growth. For Big Chapman Lake, JFNew surveyed the lake to a depth of 35 feet, while Little Chapman Lake was surveyed to a depth of 15 feet. As the Tier I protocol has not changed since the last aquatic plant management plan update, the specifics of the protocol are not repeated here.

JFNew completed two Tier II surveys within the Chapman Lakes. These occurred on May 22 and July 18, 2006. Surveys were completed using the Tier II survey protocol updated by the IDNR LARE staff in May 2006 (IDNR, 2006b). The survey protocol generally follows previous Tier II protocols; however, the 2006 protocol requires that the sampling points be stratified over the entire depth of the lake's littoral zone. Total points sampled per stratum were determined as follows:

1. Appendix D of the survey protocol was consulted to determine the number of points to be sampled. This determination was based on the lake size (surface area) and trophic status.
2. Table 3 of the survey protocol was referenced as an indicator of the number of sample points per stratum. Table 1 lists the sampling strategy for Big and Little Chapman Lake.

**Table 1. Tier II sampling strategy for Big and Little Chapman Lakes using the 2006 Tier II protocol.**

| Lake | Size | Trophic Status | Number of Points | Stratification of Points |
|---|---|---|---|---|
| Big Chapman | 512 acres | Mesotrophic | 90 | 29 pts 0-5 foot stratum<br>27 pts 5-10 foot stratum<br>24 pts 10-15 foot stratum<br>10 pts 15-20 foot stratum |
| Little Chapman | 177 acres | Eutrophic | 50 | 23 pts 0-5 foot stratum<br>17 pts 5-10 foot stratum<br>10 pts 10-15 foot stratum |

### 8.2 2006 Sampling Results

A post-treatment Tier I survey and pre- and post-treatment Tier II surveys were completed on both Big Chapman and Little Chapman Lake in 2006 by JFNew. The survey schedule for both lakes is detailed in Table 2. no samples were sent to an outside taxonomist for vouchering or identification.

**Table 2. Survey schedule of Tier I and II surveys.**

| Survey | Date |
|---|---|
| Post-treatment Tier I | July 19th,2006 |
| Pre-treatment Tier II -Spring | May 22nd, 2006 |
| Post-treatment Tier II -Summer | July 18th,2006 |

#### 8.2.1 Tier I

Plant beds identified in Big and Little Chapman Lakes are detailed in Figure 2. Additional plant bed information is discussed in detail in the following sections.

**Little Chapman Lake**

The Tier I survey on Little Chapman Lake revealed three distinct plant beds covering approximately 56 acres (Figure 2) all of which are located within the littoral zone as approximated using Secchi disk transparency. A total of forty different species were observed. Emergent and submerged plants dominated the plant beds within Little Chapman Lake accounting for 16 and 14 of the 40 species, respectively. Floating plants accounted for the remaining 7 species present in Little Chapman Lake. A list of all of the plants identified during the Tier I survey on Little Chapman Lake along with the plant abundance ratings is summarized in Table 3. Appendix A contains copies of the Tier I data sheets.

Bed 01 is located along the northern shoreline of Little Chapman Lake (Figure 2). Bed 01 is the smallest plant bed covering approximately 4.0 acres. This bed is the second most diverse containing a total of 21 species representing all three strata (submerged, emergent, and floating plants). Eurasian watermilfoil was the dominant plant species (21-60%), while common duckweed, spatterdock, white water lily, small pondweed, sago pondweed, and eel grass were present in moderate abundance (2-20%). Submerged species dominated Bed 01 accounting for 10 of the 21 species. Three rooted floating, three non-rooted floating, four emergent, and one algal species were also present at the time of the survey. Submerged and rooted floating vegetation covered 21-60% of the plant bed canopy, respectively, while non-rooted floating and emergent vegetation covered less than 2% of the plant bed canopy.

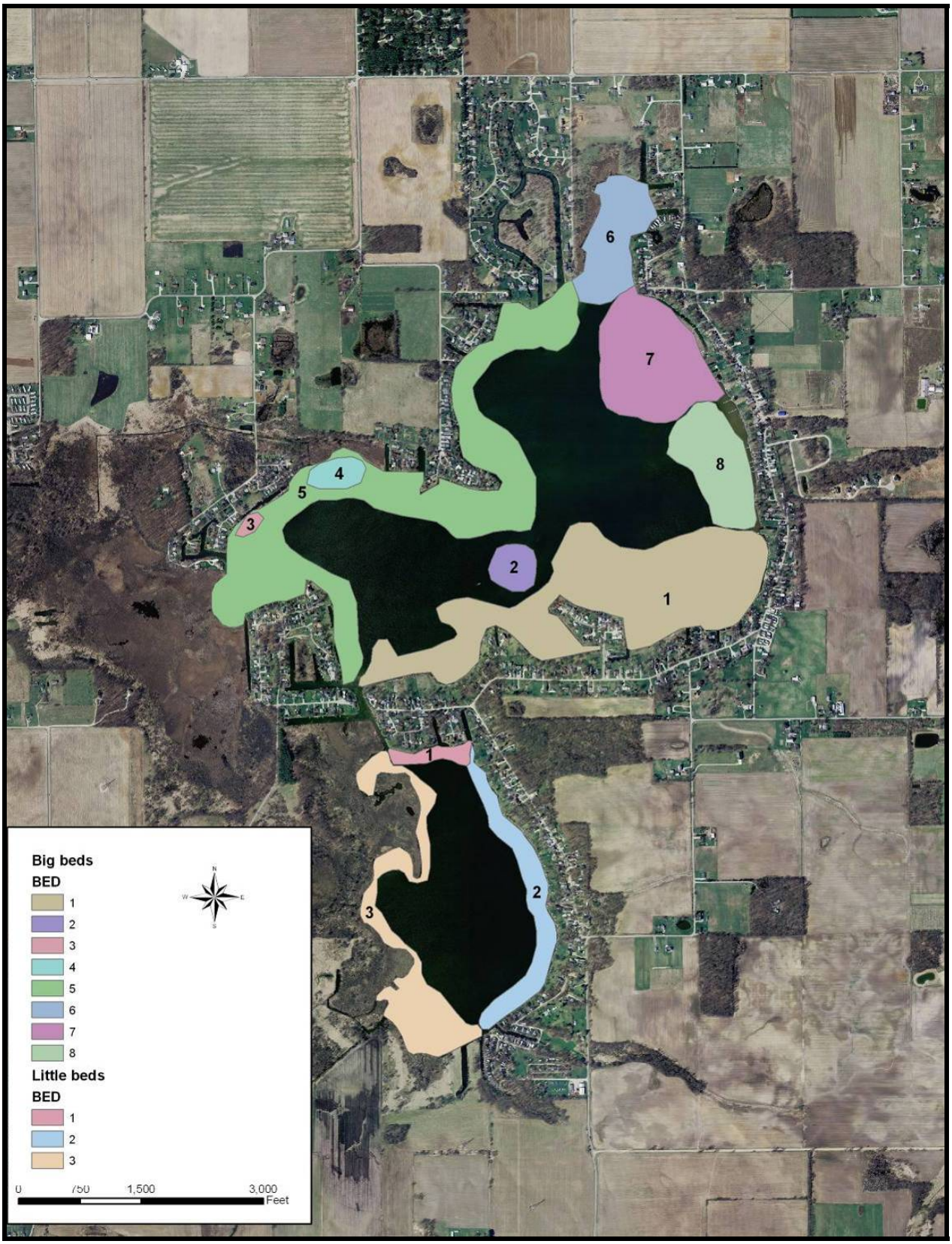


**Figure 2. Plant beds found in Big and Little Chapman Lakes using the Tier I survey method on July 19, 2006.**

**Table 3. Little Chapman Lake Tier I survey results, July 19, 2006.**

| Scientific Name | Common Name | Stratum | Bed 1 | Bed 2 | Bed 3 |
|---|---|---|---|---|---|
| *Acer saccharinum* | Silver maple | Emergent | - | - | <2% |
| *Asclepias incarnata* | Swamp milkweed | Emergent | - | - | <2% |
| *Boehmeria cylindrica* | Small-spike false-nettle | Emergent | - | - | <2% |
| *Ceratophyllum demersum* | Coontail | Submerged | - | - | 21-60% |
| *Chara species* | Chara species | Submerged | <2% | 2-20% | - |
| *Cirsium arvense* | Creeping thistle | Emergent | | - | <2% |
| *Decodon verticillatus* | Water willow | Emergent | <2% | - | <2% |
| *Dryopteris thelypteris* | Marsh shield fern | Emergent | - | - | <2% |
| *Elodea candensis* | Common waterweed | Submerged | <2% | | |
| *Filamentous algae* | Filamentous algae | Algae | <2% | <2% | 21-60% |
| *Hibiscus palustris* | Swamp rosemallow | Emergent | - | - | <2% |
| *Impatiens capensis* | Jewelweed | Emergent | - | - | <2% |
| *Lemna minor* | Common duckweed | Floating | 2-20% | <2% | <2% |
| *Lemna trisulca* | Forked duckweed | Floating | <2% | - | - |
| *Lythrum salicaria* | Purple loosestrife | Emergent | - | - | <2% |
| *Myriophyllum exalbescens* | Northern watermilfoil | Submerged | - | - | <2% |
| *Myriophyllum spicatum* | Eurasian watermilfoil | Submerged | 21-60% | <2% | 2-20% |
| *Najas flexilis* | Slender naiad | Submerged | <2% | <2% | - |
| *Najas guadalupensis* | Southern naiad | Submerged | <2% | - | - |
| *Nuphar advena* | Spatterdock | Floating | 2-20% | <2% | 2-20% |
| *Nuphar variegatum* | Bullhead lily | Floating | - | - | <2% |
| *Nymphaea tuberosa* | White water lily | Floating | 2-20% | <2% | 2-20% |
| *Phalarus arundinacaea* | Reed canary grass | Emergent | <2% | - | <2% |
| *Polygonum lapathifolium* | Heartsease | Emergent | <2% | - | - |
| *Potamogeton amplifolius* | Large-leaf pondweed | Submerged | <2% | - | - |
| *Potamogeton gramineus* | Grass-leaf pondweed | Submerged | | <2% | - |
| *Potamogeton pectinatus* | Sago pondweed | Submerged | 2-20% | <2% | 2-20% |
| *Potamogeton praelongus* | White-stemmed pondweed | Submerged | - | <2% | - |
| *Potamogeton pusillus* | Small pondweed | Submerged | 2-20% | <2% | - |
| *Potamogeton zosteriformis* | Flat-stem pondweed | Submerged | <2% | <2% | - |
| *Sambucus canadensis* | Elderberry | Emergent | - | - | <2% |
| *Scirpus pungens* | Chairmaker's rush | Emergent | - | <2% | - |
| *Solanum dulcamara* | Climbing nightshade | Emergent | - | - | <2% |
| *Spirodela polyrhiza* | Large duckweed | Floating | <2% | - | <2% |
| *Typha angustifolia* | Narrow leaf cattail | Emergent | <2% | <2% | <2% |
| *Urtica procera* | Tall nettle | Emergent | - | - | <2% |
| *Valisneria americana* | Eel grass | Submerged | 2-20% | - | 2-20% |
| *Wolffia columbiana* | American water meal | Floating | <2% | - | - |

Bed 02 is located along the eastern shoreline of Little Chapman Lake (Figure 2) and covers approximately 19.9 acres. This bed is the least diverse containing a total of fourteen species representing all three strata (submerged, emergent, and floating plants). Chara was the dominant plant species covering 2-20%, while the remaining 13 species were all present in an abundance of less than 2%. Submerged species dominated Bed 02 accounting for 8 of the 14 species. Two

emergent, one non-rooted floating, two rooted floating, and one algal species were also present at the time of the survey. Submerged vegetation covered 2-20% of the plant bed canopy, while rooted floating, non-rooted floating, and emergent vegetation each covered less than 2% of the plant bed canopy.

Bed 03 is located along the southern and western shorelines of Little Chapman Lake (Figure 2). Bed 03 covers approximately 32.3 acres and is the largest of the three beds. This bed is also the most diverse of the three plant beds containing a total of 25 species representing all three strata (submerged, emergent, and floating plants). Coontail and filamentous algae were the dominant plant species (21-60%), while Eurasian watermilfoil, spatterdock, white water lily, and sago pondweed were each present accounting for 2-20% of the canopy cover. The remaining 19 species were all present in an abundance of less than 2%. Emergent species dominated Bed 03 accounting for 14 of the 25 species. Five submerged, three rooted floating, two non-rooted floating, and one algal species were also present at the time of the survey. Submerged and rooted floating vegetation comprised 2-20% of the plant bed canopy, respectively; while emergent and rooted non-floating vegetation each covered less than 2% of the plant bed canopy.

**Little Chapman Lake Summary**

The dominant plant species found in Little Chapman Lake are Eurasian watermilfoil, chara, coontail, and filamentous algae. The plant beds hug the shoreline and extend out into the lake at variable distances ranging from 50-700 feet. Several problem areas are located throughout the lake. (These are discussed in more detail in the Beneficial and Problem Plants Section). Eurasian watermilfoil remains along the northern shoreline of Little Chapman Lake albeit in less density than previously present. The main concern is the presence of both Eurasian watermilfoil and curly-leaf pondweed within the two channels along the north side of Little Chapman Lake. These channels currently act as nurseries for Eurasian watermilfoil and serve as a source of reinfestation. Eurasian watermilfoil is also present to a lesser extent along the southern and western shorelines. Curly-leaf pondweed is also likely present in a number of locations throughout the lake. However, surveys were not conducted at the peak of curly-leaf pondweed growth. Rather, an assessment should be conducted in April or early May to adequately quantify the presence and location of curly-leaf pondweed within Little Chapman Lake.

**Big Chapman Lake**

The Tier I survey on Big Chapman Lake revealed eight distinct plant beds (Figure 2) covering approximately 298.6 acres. A total of 49 different species including 16 emergent, 14 submerged, and 7 floating species were observed. A list of the plants found during the Tier I survey on Big Chapman Lake along with the plant abundance ratings is contained in Table 4. Appendix A contains copies of the Tier I plant datasheets.

Bed 01 is located along the southern shoreline of Big Chapman Lake (Figure 2) and covers approximately 95 acres. This bed includes a number of shallow areas dominated by emergent vegetation. Only the emergent species observable from the boat are included in the summary. This bed is the most diverse of the plant beds containing a total of 35 species representing all three strata (submerged, emergent, and floating plants). Chara was the dominant plant species covering more than 60% of the bed, while spiny naiad, sago pondweed, and hardstem bulrush also covered a large portion of the plant bed (21-60 %). Eurasian watermilfoil, white water lily, spatterdock, grass-leaf pondweed, Illinois pondweed, flat-stem pondweed, Chairmaker's rush, and eel grass were present in low abundance (2-20%). The 23 remaining species all covered less than 2% of the plant bed.

Submerged species dominated Bed 01 accounting for 17 of the 35 species. Thirteen emergent, four rooted floating, and one algal species were also present at the time of the survey. Submerged vegetation dominated the canopy of the plant bed (>60%), while rooted floating vegetation and emergent species covered 21-60% of the plant bed canopy, respectively. Non-rooted floating species covered less than 2% of the plant bed.

Bed 02 is a shoal area directly north of Bed 01 (Figure 2). This bed covers approximately 6.4 acres. Bed 02 is the least diverse of the eight plant beds containing a total of nine species. Only submerged species were present in this plant bed. Chara was the dominant plant species (21-60%), while Eurasian watermilfoil was also present in elevated density (2-20%). The remaining seven species all covered less than 2%. Submerged vegetation also dominated the canopy of Bed 02 covering more than 60% of the bed.

Bed 03 is the smallest plant bed present in Big Chapman Lake covering only 1.3 acres. This bed is located along the northwestern shoreline within plant bed 05 (Figure 2). This bed contains a total of 22 species representing all three strata (submerged, emergent, and floating plants). Chara and Eurasian watermilfoil were the co-dominant plant species each covering 21-60% of the plant bed. Spiny naiad, pickerel weed, grass-leaf pondweed, Illinois pondweed, and sago pondweed each covered 2-20% of the plant bed. The remaining 15 species were all present in low abundance covering less than 2% of the plant bed. Submerged species dominated Bed 03 accounting for 12 of the 22 species. Seven emergent, two rooted floating, and one algal species were also present at the time of the survey. Submerged vegetation dominated the canopy of the plant bed covering greater than 60%, while floating rooted was less dominant (2-20%). Emergent and non-rooted floating vegetation comprised less than 2% of the plant bed.

Bed 04 is another small plant bed (5.1 acres) located within bed 05 along the northwestern shoreline of Big Chapman Lake (Figure 2). This bed contains a total of 15 species representing all three strata (submerged, emergent, and floating plants). Eurasian watermilfoil was the dominant plant species covering 21-60% of the plant bed. The remaining 14 species were all present in low abundance covering less than 2% of the plant bed. Submerged species dominated Bed 04 accounting for 9 of the 15 species. Five emergent and one rooted floating species were also present at the time of the survey. Submerged vegetation dominated the canopy of the plant bed (21-60%), while rooted floating, emergent, and non-rooted floating vegetation all covered less than 2% of the plant bed.

Bed 05 stretches along the western shoreline from the channel to Little Chapman Lake north to the southwestern edge of Nellie's Bay (Figure 2). Bed 05 covers approximately 105.4 acres. This bed is diverse containing a total of 24 species representing all three strata (submerged, emergent, and floating plants). Chara was the dominant plant species covering greater than 60%, while spiny naiad and grass-leaf pondweed were less dominant (21-60%). Coontail, Eurasian watermilfoil, slender naiad, southern naiad, sago pondweed, and eel grass were each present in low abundance covering 2-20%. The remaining 13 species were all present in low abundance covering less than 2% of the bed. Submerged species dominated Bed 05 accounting for 14 of the 24 species. Nine emergent, one non-rooted floating, two rooted floating, and one algal species were also present at the time of the survey. Submerged vegetation dominated the canopy of the plant bed (>60%), while rooted floating, emergent, and non-rooted floating vegetation each covered less than 2% of the plant bed.

Bed 06 is located in Nellie's Bay (Figure 2) and covers approximately 21.9 acres. This bed is the second most diverse of the eight plant beds containing a total of 27 species representing all three

strata (submerged, emergent, and floating plants). Chara was the dominant plant species covering 21-60%, while Eurasian watermilfoil, nitella, spatterdock, white water lily, grass-leaf pondweed, sago pondweed, and eel grass were each less dominant (2-20%). The remaining 19 species were all present in low abundance covering less than 2% of the bed. Submerged species dominated Bed 06 accounting for 17 of the 35 species. Thirteen emergent, two rooted floating, two non-rooted floating, and one algal species were also present at the time of the survey. Submerged vegetation dominated the canopy of the plant bed (>60%), while rooted floating, emergent, and non-rooted floating vegetation covered less than 2% of the plant bed.

Bed 07 is located along the eastern shoreline of Big Chapman Lake (Figure 2) and covers approximately 39.6 acres. This bed contains 18 species representing all three strata (submerged, emergent, and floating plants). Chara was the dominant plant species (>60%), while spiny naiad was less dominant (21-60%). Eurasian watermilfoil, sago pondweed, hard-stem bulrush, and eel grass were all present in low-abundance (2-20%). The 12 remaining species were all present in low abundance covering less than 2% of the bed. Submerged species dominated Bed 07 accounting for 17 of the 35 species. Thirteen emergent, two rooted floating, two non-rooted floating, and one algal species were also present at the time of the survey. Submerged vegetation dominated the canopy of the plant bed (>60%), while emergent vegetation comprised 21-60% of the plant bed. Non-rooted floating and emergent vegetation covered less than 2% of the plant bed canopy.

Bed 08 is located south of plant bed 07 along the eastern shoreline of Big Chapman Lake (Figure 2). This bed covers approximately 23.9 acres. Bed 08 contains 17 species representing all three strata (submerged, emergent, and floating plants). Chara was the dominant plant species (21-60%), while grass-leaf pondweed, sago pondweed, and eel grass were each present in low abundance (2-20%). The 13 remaining species were all present in an abundance covering less than 2% of the canopy. Submerged species dominated Bed 08 and accounted for 12 of the 17 species. Three floating and two emergent species were also present at the time of the survey. Submerged vegetation dominated the canopy of the plant bed (21-60%), while rooted floating, emergent, and non-rooted floating covered less than 2% of the plant bed canopy.

**Big Chapman Lake Summary**

Chara species were dominant in six of the eight plant beds and co-dominant with Eurasian watermilfoil in one plant bed. Like Little Chapman Lake, several problems areas remain within Big Chapman Lake's plant community (Figure 3). Eurasian watermilfoil remains in low density along the eastern edge of Big Chapman Lake. Higher densities of Eurasian watermilfoil are present within Nellie's Bay and in the western portion of the lake (Bed 05). Eurasian watermilfoil within the channels are likely a source of Eurasian watermilfoil and should be addressed to limit re-infestation.

All the plant beds hugged the shoreline and extended into the lake 50 to 1500 feet. The only exception is Bed 02, which is located on the southern part in the lake on a "sunken island." This bed is not contiguous with the shore or any other plant bed. As noted for Little Chapman Lake, the extent of curly-leaf pondweed infestation could not adequately be addressed during the July survey due to the growth pattern of curly-leaf pondweed. An additional survey should occur early in 2007 to adequately determine curly-leaf pondweed treatment locations. Any treatment of this species should occur outside of the LARE program.

**Table 4. Big Chapman Lake Tier I survey results, July 19, 2006.**

| Scientific Name | Common Name | Stratum | Bed 1 | Bed 2 | Bed 3 | Bed 4 | Bed 5 | Bed 6 | Bed 7 | Bed 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Asclepias incarnata* | Swamp milkweed | Emergent | <2% | - | - | <2% | - | <2% | <2% | - |
| *Cephalanthus occidentalis* | Buttonbush | Emergent | - | - | - | - | - | - | <2% | - |
| *Ceratophyllum demersum* | Coontail | Submerged | - | - | - | <2% | 2-20% | - | - | <2% |
| *Chara* species | Muskgrass species | Submerged | >60% | 21-60% | 21-60% | <2% | >60% | 21-60% | >60% | 21-60% |
| *Cicuta bulbifera* | Bulblet-bearing waterhemlock | Emergent | <2% | - | - | - | - | - | - | - |
| *Cladium mariscoides* | Twig rush | Emergent | <2% | - | - | - | - | - | - | - |
| *Cornus obliqua* | Blue-fruited dogwood | Emergent | - | - | - | - | - | - | <2% | - |
| *Carex species* | Sedge species | Submerged | - | - | - | - | - | - | - | <2% |
| *Decodon verticillatus* | Water willow | Emergent | <2% | - | <2% | <2% | - | <2% | <2% | - |
| *Elodea candensis* | Common waterweed | Submerged | <2% | - | <2% | <2% | 2-20% | - | <2% | <2% |
| *Filamentous algae* | Filamentous algae | Algae | <2% | - | <2% | - | <2% | <2% | - | - |
| *Heteranthia dubia* | Water star grass | Emergent | | - | - | - | - | <2% | - | - |
| *Hibiscus palustris* | Swamp rosemallow | Emergent | <2% | - | - | - | - | <2% | <2% | - |
| *Leersia oryzoides* | Rice cut grass | Emergent | <2% | - | - | - | - | - | - | - |
| *Lemna minor* | Common duckweed | Floating | <2% | - | - | - | <2% | <2% | - | <2% |
| *Lippia lanceolata* | Fog fruit | Emergent | - | - | - | - | - | - | - | <2% |
| *Lythrum salicaria* | Purple loosestrife | Emergent | <2% | - | <2% | <2% | - | <2% | <2% | - |
| *Myriophyllum exalbescens* | Northern watermilfoil | Submerged | - | <2% | - | <2% | - | <2% | - | - |
| *Myriophyllum heterophyllum* | Two-leaf watermilfoil | Submerged | <2% | - | - | - | - | - | <2% | - |
| *Myriophyllum spicatum* | Eurasian watermilfoil | Submerged | 2-20% | <2% | 21-60% | 21-60% | 2-20% | 2-20% | 2-20% | <2% |
| *Najas flexilis* | Slender naiad | Submerged | - | - | - | - | 2-20% | - | - | - |
| *Najas gracillima* | Thread-like naiad | Submerged | | - | - | <2% | - | <2% | - | <2% |
| *Najas guadalupensis* | Southern naiad | Submerged | <2% | - | - | - | 2-20% | - | - | - |
| *Najas marina* | Spiny naiad | Submerged | 21-60% | 2-20% | 2-20% | - | 21-60% | <2% | 21-60% | <2% |
| *Nitella* species | Muskgrass species | Submerged | <2% | - | <2% | <2% | 2-20% | 2-20% | - | - |
| *Nuphar advena* | Spatterdock | Floating | 2-20% | - | <2% | - | - | 2-20% | - | - |
| *Nymphaea tuberosa* | White water lily | Floating | 2-20% | - | <2% | <2% | <2% | 2-20% | <2% | <2% |
| *Phalarus arundinacaea* | Reed canary grass | Emergent | <2% | - | - | <2% | - | - | <2% | - |
| *Pontederia cordata* | Pickerel weed | Emergent | <2% | - | 2-20% | - | - | <2% | - | - |
| *Potamogeton amplifolius* | Large-leaf pondweed | Submerged | <2% | - | - | - | <2% | <2% | - | <2% |
| *Potamogeton crispus* | Curly-leaf pondweed | Submerged | <2% | - | - | - | <2% | <2% | - | - |
| *Potamogeton foliosus* | Leafy pondweed | Submerged | - | - | - | - | <2% | - | - | - |

| Scientific Name | Common Name | Stratum | Bed 1 | Bed 2 | Bed 3 | Bed 4 | Bed 5 | Bed 6 | Bed 7 | Bed 8 |
|---|---|---|---|---|---|---|---|---|---|---|
| *Potamogeton gramineus* | Grass-leaf pondweed | Submerged | 2-20% | <2% | 2-20% | - | 21-60% | 2-20% | <2% | 2-20% |
| *Potamogeton illinoensis* | Illinois pondweed | Submerged | 2-20% | - | 2-20% | <2% | <2% | <2% | - | - |
| *Potamogeton nodosus* | Long-leaf pondweed | Submerged | <2% | - | - | - | <2% | <2% | - | <2% |
| *Potamogeton pectinatus* | Sago pondweed | Submerged | 21-60% | <2% | 2-20% | <2% | 2-20% | 2-20% | 2-20% | 2-20% |
| *Potamogeton praelongus* | White-stem pondweed | Submerged | - | - | <2% | - | <2% | - | - | - |
| *Potamogeton pusillus* | Small pondweed | Submerged | <2% | - | - | - | - | - | - | - |
| *Potamogeton zosteriformis* | Flat-stem pondweed | Submerged | 2-20% | - | - | - | <2% | - | - | - |
| *Sagittaria latifolia* | Common arrowhead | Submerged | - | - | <2% | - | - | - | - | - |
| *Scirpus acutus* | Hardstem bulrush | Emergent | 21-60% | - | <2% | - | <2% | <2% | 2-20% | - |
| *Scirpus pungens* | Chairmaker's rush | Emergent | 2-20% | - | <2% | - | <2% | <2% | - | <2% |
| *Solanum dulcamara* | Climbing nightshade | Emergent | <2% | - | - | - | - | - | - | - |
| *Spirodela polyrhiza* | Large duckweed | Floating | <2% | - | - | - | - | - | - | <2% |
| *Typha angustifolia* | Narrow-leaf cattail | Emergent | <2% | - | <2% | <2% | - | <2% | <2% | - |
| *Typha latifolia* | Broad-leaf cattail | Emergent | - | - | <2% | - | - | - | - | - |
| *Utricularia geminiscapa* | Bog bladderwort | Submerged | - | <2% | - | - | - | - | - | - |
| *Utricularia vulgaris* | Common bladderwort | Submerged | <2% | <2% | <2% | - | <2% | <2% | - | - |
| *Valisneria americana* | Eel grass | Submerged | 2-20% | <2% | <2% | - | 2-20% | 2-20% | 2-20% | 2-20% |

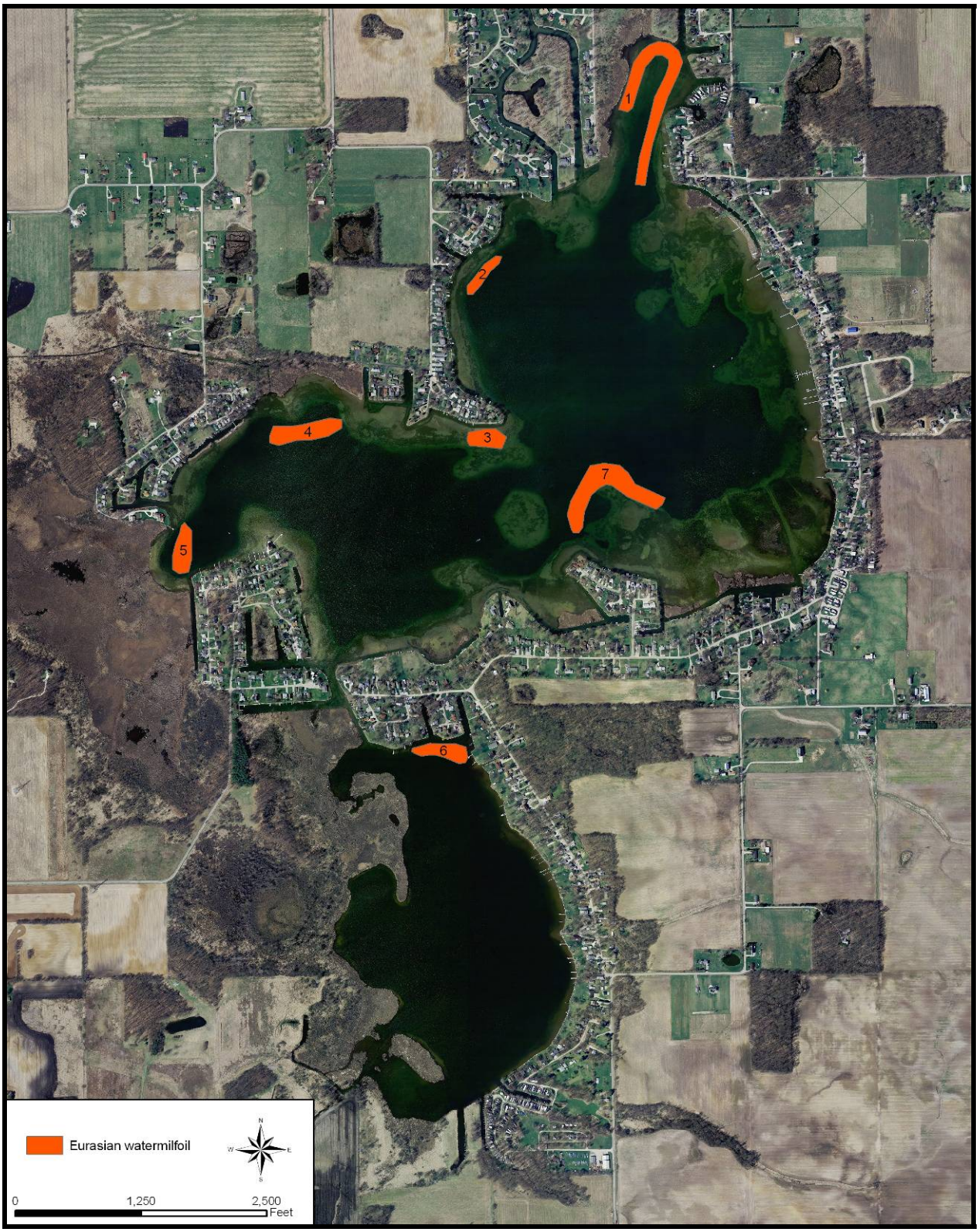


**Figure 3. Eurasian watermilfoil and curly-leaf pondweed locations in Big and Little Chapman Lakes.**

### 8.2.2 Tier II

Two Tier II surveys were completed in order to document changes in the plant community resulting from the aquatic herbicide treatment. The Tier II surveys were completed on May 22, 2006 ("pre-treatment") and on July 19, 2006 ("post-treatment"). Raw data is included in Appendix A.

**Little Chapman Lake**

Transparency was measured using a Secchi disk prior to both sampling events. Transparency was found to be 3.3 feet in the spring and 2.75 feet during the summer survey. Based on the survey protocol, plants were sampled to a depth of 15 feet. However, plants were only present to a maximum depth of 10 feet during the spring pre-treatment survey. Fifty sites were randomly selected within the littoral zone based on the stratification indicated in the protocol. Results of the sampling are listed in Table 5 and 6.

During the pre-treatment survey, coontail dominated the plant community over all depths (0-10 feet). This species was found at the highest percentage of sites throughout the water column (36%) and also had the highest relative and mean density (Table 5). Throughout the water column, northern watermilfoil, Eurasian watermilfoil, and curly-leaf pondweed were relatively dense and were found at 26%, 24%, and 16% of sites, respectively (Table 5). Coontail, northern watermilfoil, and Eurasian watermilfoil dominated Little Chapman Lake in both the 0-5 and 5-10 foot strata. In addition, chara was the fourth most abundant plant species in the 0-5 foot stratum but was absent from the 5-10 foot stratum, while curly-leaf pondweed was scarce in the 0-5 foot stratum (dominance of 1.74) yet abundant in the 5-10 foot stratum (dominance of 7.06). No plants were found within the 10-15 foot strata. Figures 4-6 document sampling locations (Figure 4) and sites where Eurasian watermilfoil (Figure 5) and curly-leaf pondweed (Figure 6) were identified during the pre-treatment survey.

Following treatment, coontail and northern watermilfoil were still the most abundant species in Little Chapman Lake. Coontail was present at 42% of the sample sites and had the greatest relative and mean densities throughout the water column and in each of the three strata (0-5 feet, 5-10 feet and 10-15 feet). Although Eurasian watermilfoil was found at less sites during the post-treatment survey (18% compared to 24% during pre-treatment), it had a higher relative and mean density than that present during the pre-treatment survey. Conversely, curly-leaf pondweed was identified at only 4% of sites during the post treatment survey compared to 16% of sites during the pre-treatment survey. Additionally, four plant species were identified in the 10-15 foot strata during the post-treatment survey where none were present during the pretreatment survey. Figures 7-9 detail plant sampling locations (Figure 7) and the locations where Eurasian watermilfoil (Figure 8) and curly-leaf pondweed (Figure 9) were identified during the post-treatment surveys.

**Table 5. Little Chapman Lake, pre-treatment Tier II survey metrics and data, May 22, 2006.**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Sites with plants: | 40 | Mean species/site: | 1.35 |
| Date: | 6-May-22 | Sites with native plants: | 36 | Mean native species/site: | 0.61 |
| Secchi (ft): | 3.3 | Number of species: | 10 | Species diversity: | 0.84 |
| Maximum plant depth (ft): | 10 | Number of native species: | 8 | Native species diversity: | 0.76 |
| Trophic status: | eutrophic | Maximum species/site: | 5 | Rake diversity: | 0.83 |
| Total number of sites: | 50 | Mean rake score: | 1.05 | Native rake diversity: | 0.75 |
| | | | | | |
| **All Depths (0-15 feet)** | | | | | |
| **Common Name** | **Scientific Name** | **Site Frequency** | **Relative Density** | **Mean Density** | **Dominance** |
| Coontail | *Ceratophyllum demersum* | 36 | 0.40 | 1.11 | 8.00 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 26 | 0.26 | 1.00 | 5.20 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 24 | 0.24 | 1.00 | 4.80 |
| Curly-leaf pondweed | *Potamogeton crispus* | 16 | 0.16 | 1.00 | 3.20 |
| Sago pondweed | *Stuckenia pectinatus* | 12 | 0.12 | 1.00 | 2.40 |
| Chara | *Chara spp.* | 10 | 0.10 | 1.00 | 2.00 |
| Grassy pondweed | *Potamogeton gramineus* | 6 | 0.06 | 1.00 | 1.20 |
| Southern naiad | *Najas guadalupensis* | 4 | 0.04 | 1.00 | 0.80 |
| Small pondweed | *Potamogeton pusillus* | 2 | 0.02 | 1.00 | 0.40 |
| Eel grass | *Vallisneria americana* | 2 | 0.02 | 1.00 | 0.40 |
| Filamentous algae | *Algae* | 80 | | | |
| | | | | | |
| **Depth: 0-5 feet** | | | | | |
| Coontail | *Ceratophyllum demersum* | 48 | 0.48 | 1.00 | 9.57 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 43 | 0.43 | 1.00 | 8.70 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 26 | 0.22 | 0.83 | 4.35 |
| Chara | *Chara spp.* | 22 | 0.22 | 1.00 | 4.35 |
| Sago pondweed | *Stuckenia pectinatus* | 17 | 0.17 | 1.00 | 3.48 |
| Grassy pondweed | *Potamogeton gramineus* | 13 | 0.13 | 1.00 | 2.61 |
| Southern naiad | *Najas guadalupensis* | 9 | 0.09 | 1.00 | 1.74 |
| Curly-leaf pondweed | *Potamogeton crispus* | 9 | 0.09 | 1.00 | 1.74 |
| Small pondweed | *Potamogeton pusillus* | 4 | 0.04 | 1.00 | 0.87 |
| Filamentous algae | *Algae* | 96 | | 1.09 | |

| Common Name | Scientific Name | Site Frequency | Relative Density | Mean Density | Dominance |
|---|---|---|---|---|---|
| **Depth: 5-10 feet** | | | | | |
| Coontail | *Ceratophyllum demersum* | 41 | 0.53 | 1.29 | 10.59 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 41 | 0.41 | 1.00 | 8.24 |
| Curly-leaf pondweed | *Potamogeton crispus* | 35 | 0.35 | 1.00 | 7.06 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 12 | 0.12 | 1.00 | 2.35 |
| Sago pondweed | *Stuckenia pectinatus* | 12 | 0.12 | 1.00 | 2.35 |
| Eel grass | *Vallisneria americana* | 6 | 0.06 | 1.00 | 1.18 |
| Filamentous algae | *Algae* | 71 | | | |
| | | | | | |
| **Depth: 10-15 feet** | | | | | |
| Filamentous algae | *Algae* | 50 | | | |

**Table 6. Little Chapman Lake, post-treatment Tier II survey metrics and data, July 18, 2006.**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Sites with plants: | 40.00 | Mean species/site: | 1.56 |
| Date: | 18-Jul-06 | Sites with native plants: | 36.00 | Mean native species/site: | 1.34 |
| Secchi (ft): | 2.75 | Number of species: | 10.00 | Species diversity: | 0.80 |
| Maximum plant depth (ft): | 14 | Number of native species: | 8.00 | Native species diversity: | 0.74 |
| Trophic status: | eutrophic | Maximum species/site: | 5.00 | Rake diversity: | 0.68 |
| Total number of sites: | 50 | | | Native rake diversity: | 0.59 |
| | | | | | |
| **All Depths (0-15 feet)** | | | | | |
| **Common Name** | **Scientific Name** | **Site Frequency** | **Relative Density** | **Mean Density** | **Dominance** |
| Coontail | *Ceratophyllum demersum* | 42 | 1.02 | 2.43 | 20.40 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 20 | 0.24 | 1.20 | 4.80 |
| Sago pondweed | *Stuckenia pectinatus* | 18 | 0.22 | 1.22 | 4.40 |
| Eel grass | *Vallisneria americana* | 18 | 0.18 | 1.00 | 3.60 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 18 | 0.30 | 1.67 | 6.00 |
| Chara | *Chara spp.* | 16 | 0.24 | 1.50 | 4.80 |
| Grassy pondweed | *Potamogeton gramineus* | 6 | 0.06 | 1.00 | 1.20 |
| Southern naiad | *Najas guadalupensis* | 4 | 0.04 | 1.00 | 0.80 |
| Water star grass | *Heteranthia dubia* | 2 | 0.02 | 1.00 | 0.40 |
| Slender naiad | *Najas flexilis* | 2 | 0.02 | 1.00 | 0.40 |
| Large-leaf pondweed | *Potamogeton amplifolius* | 2 | 0.02 | 1.00 | 0.40 |
| Flat-stalked pondweed | *Potamogeton friesii* | 2 | 0.02 | 1.00 | 0.40 |
| Common bladderwort | *Utricularia vulgaris* | 2 | 0.02 | 1.00 | 0.40 |
| Curly-leaf pondweed | *Potamogeton crispus* | 4 | 0.04 | 1.00 | 0.80 |
| Filamentous algae | *Algae* | 78 | | | |
| | | | | | |
| **Depth: 0-5 feet** | | | | | |
| Coontail | *Ceratophyllum demersum* | 48 | 0.83 | 1.73 | 16.52 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 35 | 0.43 | 1.25 | 8.70 |
| Sago pondweed | *Stuckenia pectinatus* | 35 | 0.43 | 1.25 | 8.70 |
| Eel grass | *Vallisneria americana* | 35 | 0.35 | 1.00 | 6.96 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 30 | 0.57 | 1.86 | 11.30 |
| Chara | *Chara spp.* | 26 | 0.26 | 1.00 | 5.22 |

| Common Name | Scientific Name | Site Frequency | Relative Density | Mean Density | Dominance |
|---|---|---|---|---|---|
| **Depths (0-5 feet cont.)** | | | | | |
| Grassy pondweed | *Potamogeton gramineus* | 13 | 0.13 | 1.00 | 2.61 |
| Curly-leaf pondweed | *Potamogeton crispus* | 9 | 0.09 | 1.00 | 1.74 |
| Water star grass | *Heteranthia dubia* | 4 | 0.04 | 1.00 | 0.87 |
| Slender naiad | *Najas flexilis* | 4 | 0.04 | 1.00 | 0.87 |
| Southern naiad | *Najas guadalupensis* | 4 | 0.04 | 1.00 | 0.87 |
| Large-leaf pondweed | *Potamogeton amplifolius* | 4 | 0.04 | 1.00 | 0.87 |
| Flat-stalked pondweed | Potamogeton friesii | 4 | 0.04 | 1.00 | 0.87 |
| Common bladderwort | *Utricularia vulgaris* | 4 | 0.04 | 1.00 | 0.87 |
| Filamentous algae | *Algae* | 87 | | | |
| | | | | | |
| **Depth: 5-10 feet** | | | | | |
| Coontail | *Ceratophyllum demersum* | 41 | 1.35 | 3.29 | 27.06 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 12 | 0.12 | 1.00 | 2.35 |
| Chara | *Chara spp.* | 6 | 0.06 | 1.00 | 1.18 |
| Southern naiad | *Najas guadalupensis* | 6 | 0.06 | 1.00 | 1.18 |
| Eel grass | *Vallisneria americana* | 6 | 0.06 | 1.00 | 1.18 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 6 | 0.06 | 1.00 | 1.18 |
| Filamentous algae | *Algae* | 88 | | | |
| | | | | | |
| **Depth: 10-15 feet** | | | | | |
| Coontail | *Ceratophyllum demersum* | 30 | 0.90 | 3.00 | 18.00 |
| Sago pondweed | *Stuckenia pectinatus* | 20 | 0.10 | 1.00 | 2.00 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 20 | 0.10 | 1.00 | 2.00 |
| Chara | *Chara spp.* | 10 | 0.50 | 5.00 | 10.00 |
| Filamentous algae | *Algae* | 40 | | | |

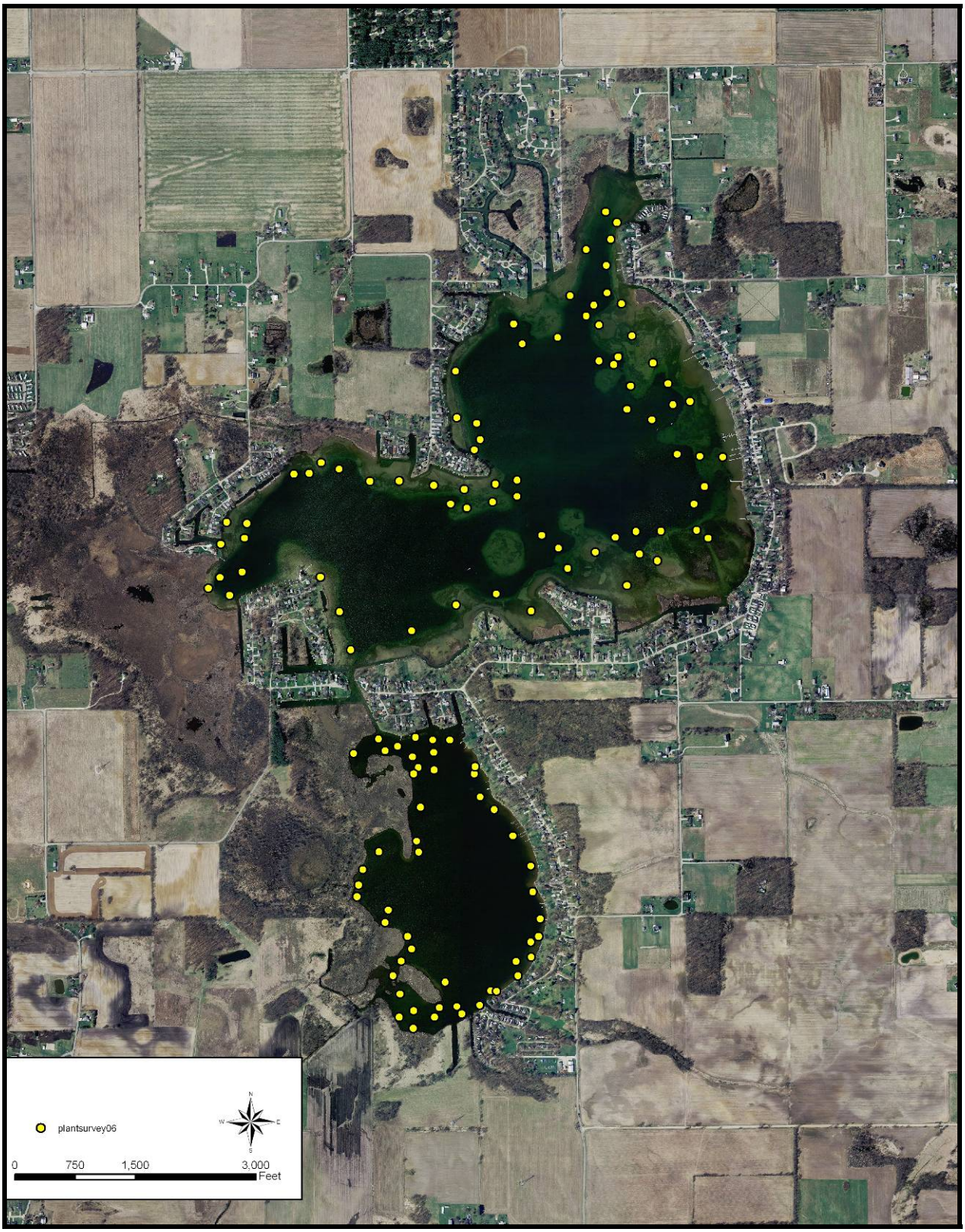


**Figure 4. Sampling locations for the May 22, 2006, Tier II Survey, Big and Little Chapman Lake.**

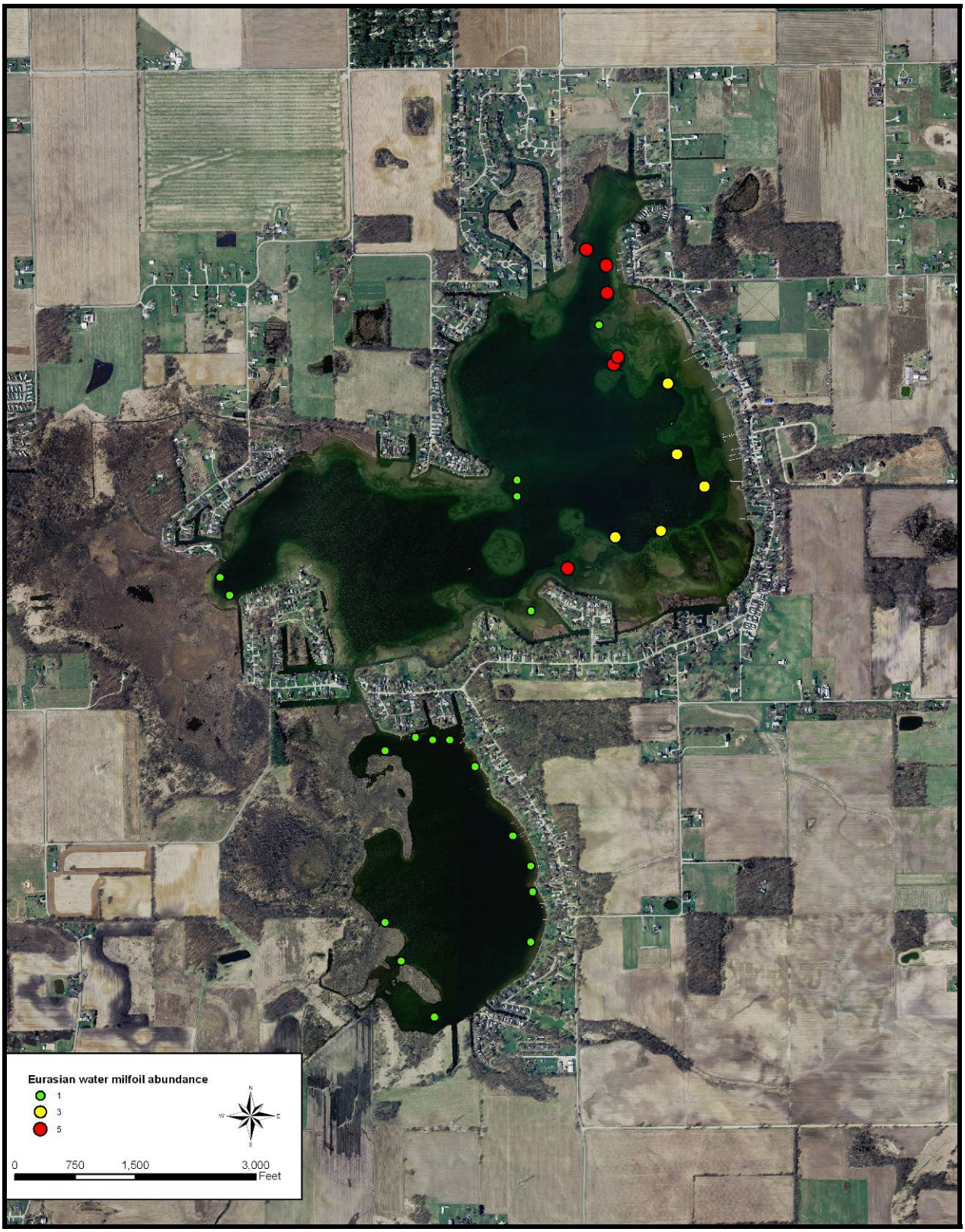


**Figure 5. Eurasian watermilfoil locations and densities as surveyed May 22, 2006.**

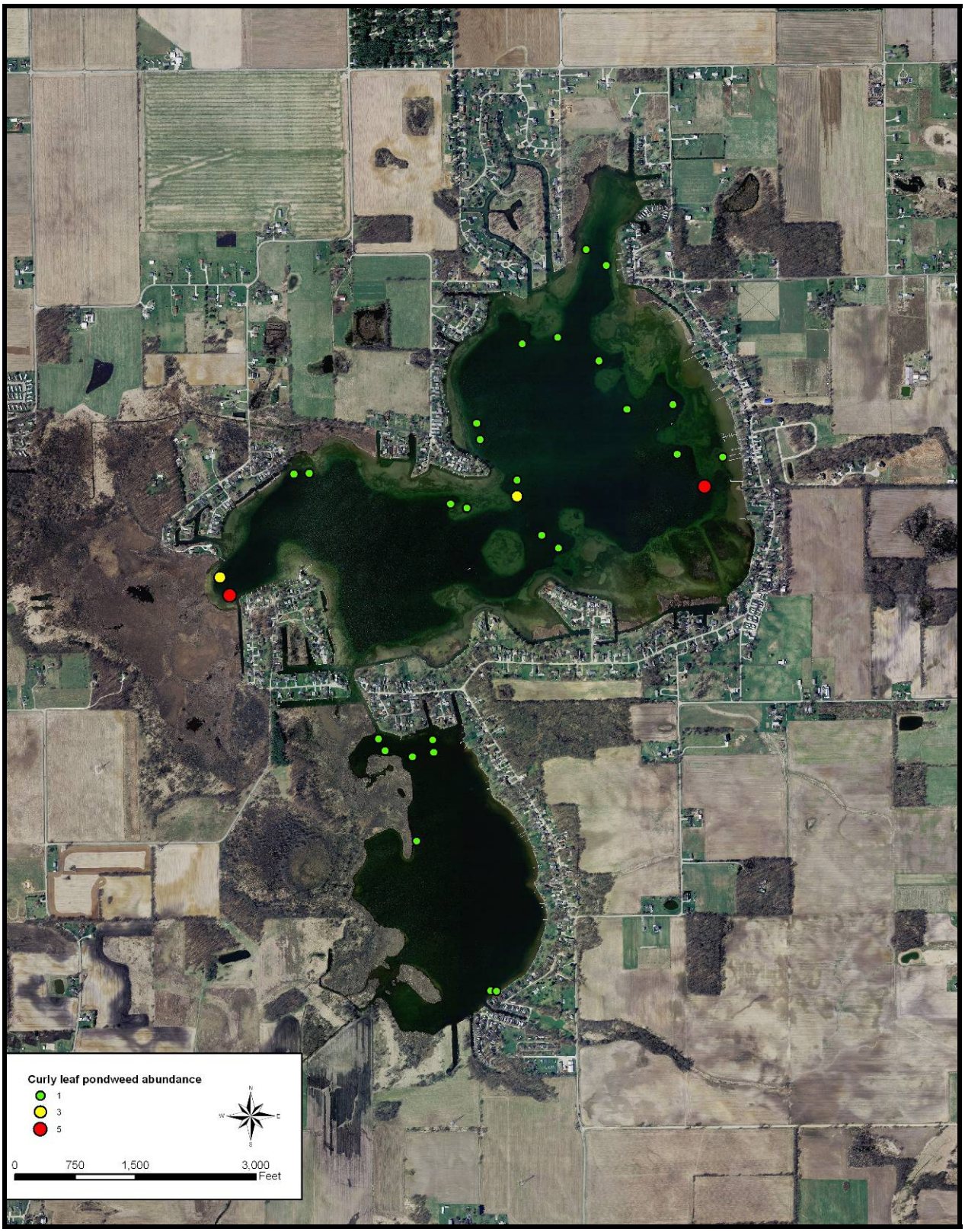


**Figure 6. Curly-leaf pondweed locations and densities as surveyed May 22, 2006.**

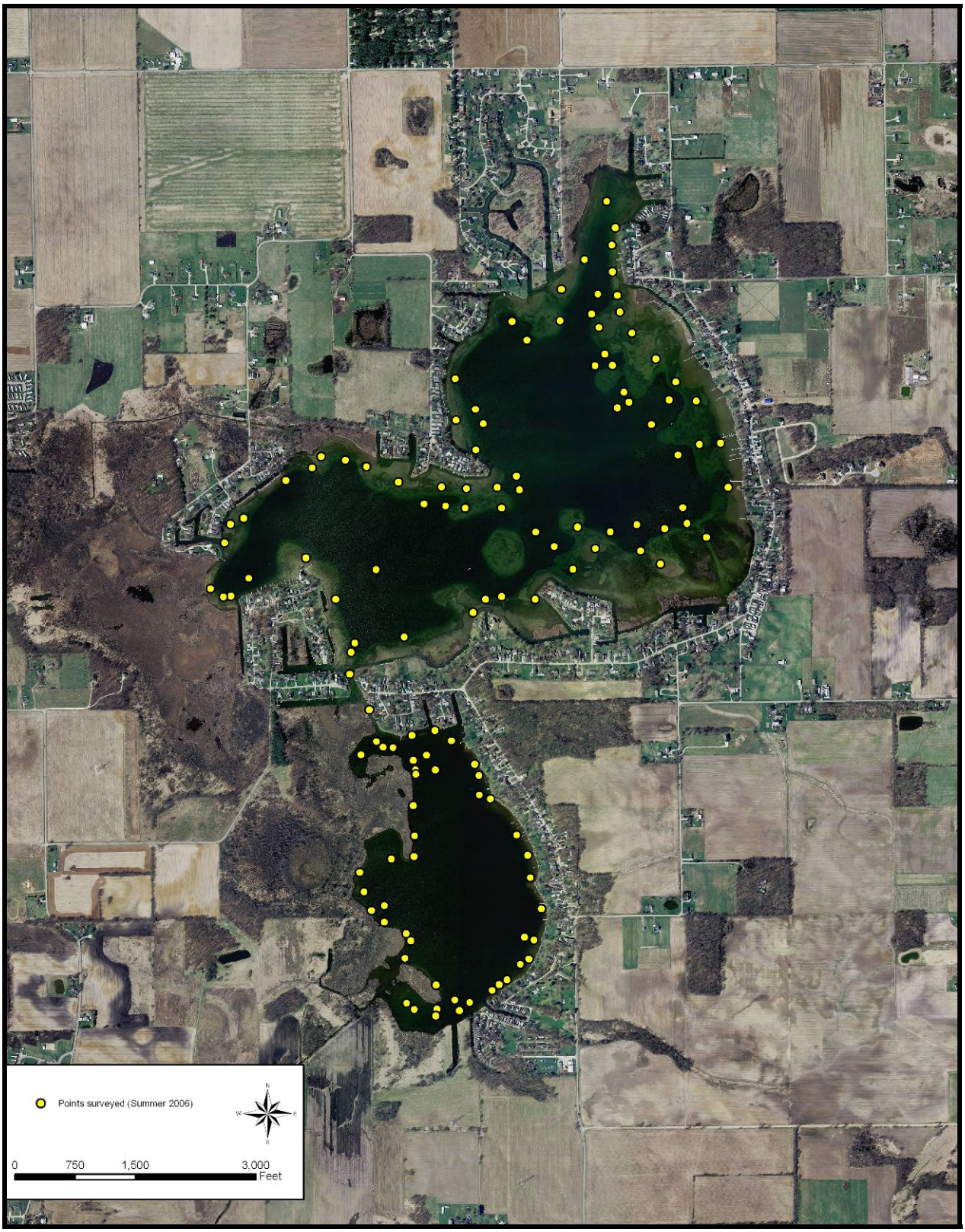


**Figure 7. Sampling locations for the July 18, 2006, Tier II Survey, Big and Little Chapman Lake.**

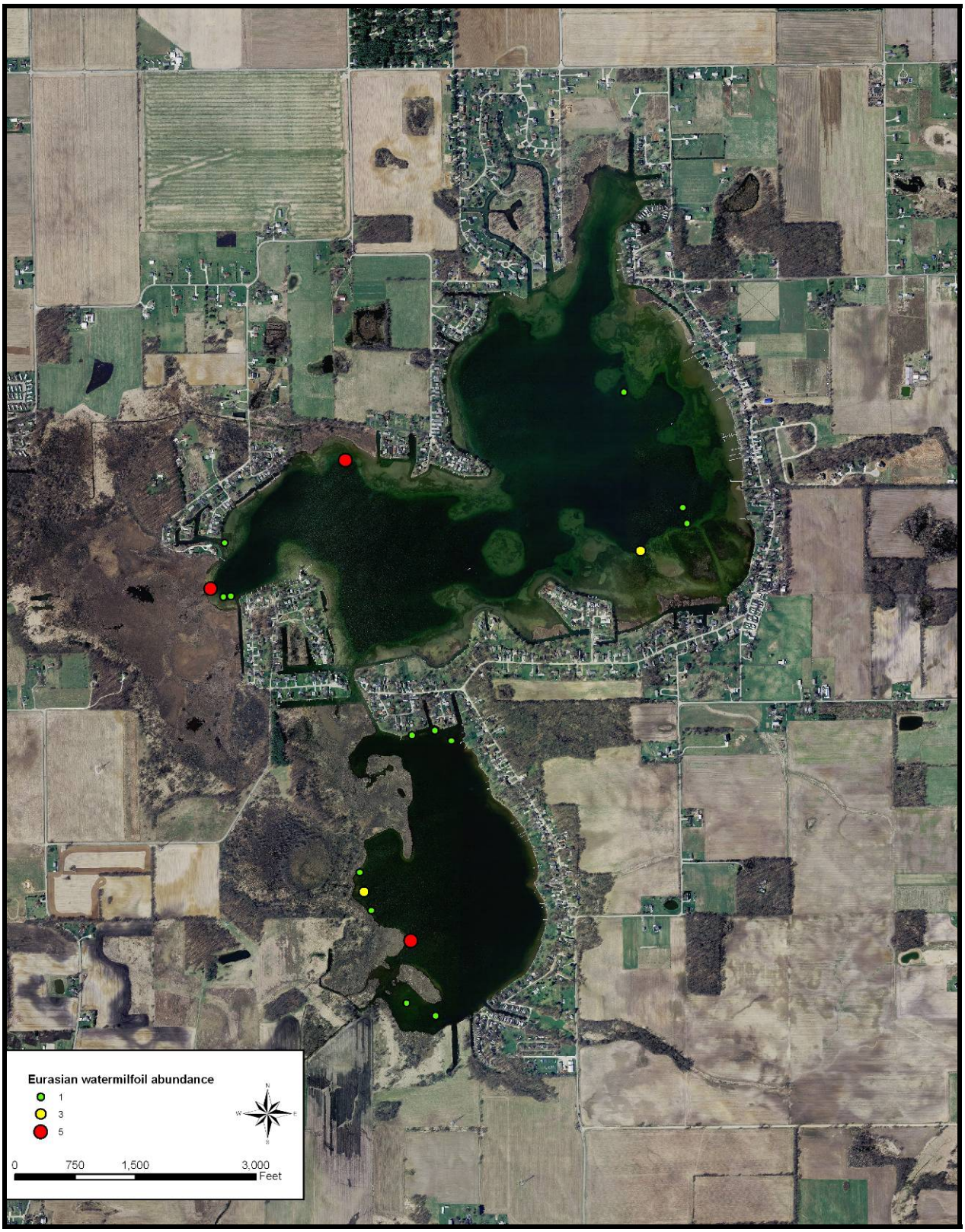


**Figure 8. Eurasian watermilfoil locations and densities as surveyed July 18, 2006.**

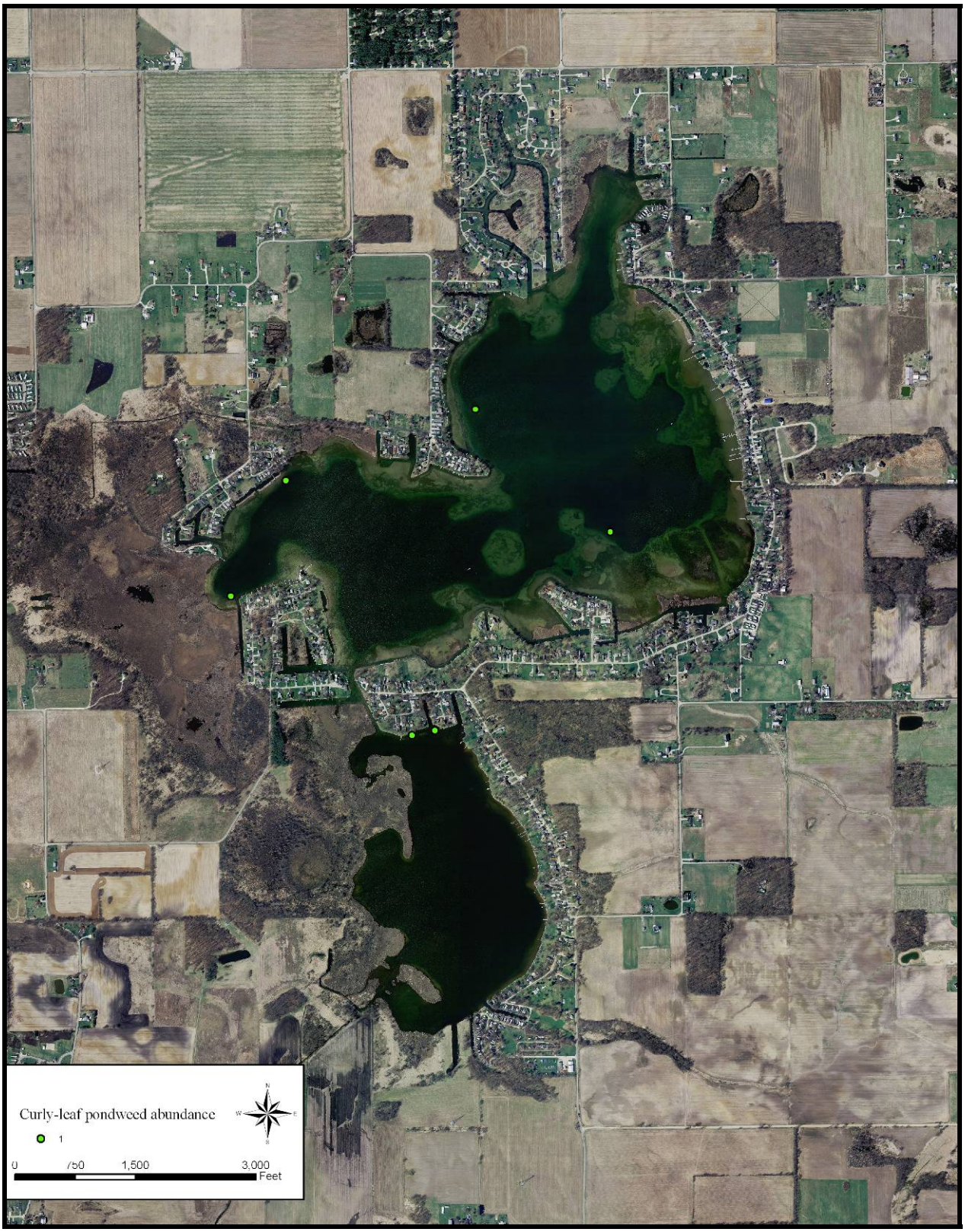


**Figure 9. Curly-leaf pondweed locations and densities as surveyed July 18, 2006.**

When recently collected data is compared with data collected by Pearson (2004), Little Chapman Lake possessed greater diversity than the lakes surveyed by Pearson (Table 7). Little Chapman Lake possessed 10 species during the pre- and post-treatment surveys, while Pearson collected only eight species on average. Little Chapman Lake also possessed more native species (8 compared to Pearson's 7) and greater rake diversity (0.75 and 0.68 for pre- and post-treatment, respectively compared with 0.62 by Pearson). However, overall Little Chapman Lake possessed poorer mean rake density. It should be noted that Pearson study was not intended nor designed to create baseline native aquatic plant data for evaluative purposes, and therefore over-reliance on comparisons to Pearson's data in making management decisions should be avoided.

**Table 7. A comparison of the aquatic plant community in Little Chapman Lake with the average values for plant community metrics found by Pearson (2004) in his survey of 21 northern Indiana lakes.**

| | Little Chapman Lake | | Indiana Average |
|---|---|---|---|
| | Pre-treatment (5/22/06) | Post-treatment (7/18/06) | 2004 |
| Percentage of littoral sites containing plants | 80 | - | - |
| Number of species collected | 10 | 10 | 8 |
| Number of native species collected | 8 | 8 | 7 |
| Mean Rake density | 1.05 | - | 3.3 |
| Rake Diversity (SDI) | 0.75 | 0.68 | 0.62 |
| Native Rake Diversity (SDI) | 0.75 | 0.59 | 0.5 |
| Species Richness (Avg # species/site) | 1.35 | 1.56 | 1.61 |
| Native Species Richness | 0.61 | 1.34 | 1.33 |
| Site Species Diversity | 0.84 | 0.8 | 0.66 |
| Site Species native diversity | 0.76 | 0.74 | 0.56 |

**Big Chapman Lake**

Transparency was measured using a Secchi disk prior to both Tier II sampling events. Transparency was found to be 13.5 feet in the spring survey and 7 feet during the Tier II summer survey. Based on the survey protocol, plants were sampled to a depth of 20 feet. Plants were present throughout the entire sampled depth of 20 feet. Ninety sites were randomly selected within the littoral zone based on the stratification indicated in the protocol. Results of the sampling are listed in Tables 8 and 9.

**Table 8. Big Chapman Lake, pre-treatment Tier II survey metrics and data, May 6, 2006.**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Sites with plants: | 85 | Mean species/site: | 3.28 |
| Date: | 6-May-22 | Sites with native plants: | 82 | Mean native species/site: | 2.85 |
| Secchi (ft): | 13.5 | Number of species: | 21 | Species diversity: | 0.90 |
| Maximum plant depth: | 20 | Number of native species: | 19 | Native species diversity: | 0.88 |
| Trophic status: | mesotrophic | Maximum species/site: | 8 | Rake diversity: | 0.94 |
| Total number of sites: | 90 | Mean rake score: | 1.72 | Native rake diversity: | 0.87 |
| | | | | | |
| **All Depths (0-20 feet)** | | | | | |
| **Common Name** | **Scientific Name** | **Site Frequency** | **Relative Density** | **Mean Density** | **Dominance** |
| Chara | *Chara spp.* | 50 | 0.64 | 1.29 | 12.89 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 19 | 0.57 | 3.00 | 11.33 |
| Coontail | *Ceratophyllum demersum* | 32 | 0.54 | 1.69 | 10.89 |
| Curly-leaf pondweed | *Potamogeton crispus* | 26 | 0.38 | 1.48 | 7.56 |
| Nitella | *Nitella* | 12 | 0.19 | 1.55 | 3.78 |
| Sago pondweed | *Stuckenia pectinatus* | 18 | 0.18 | 1.00 | 3.56 |
| Spiny naiad | *Najas marina* | 9 | 0.09 | 1.00 | 1.78 |
| Common waterweed | *Elodea canadensis* | 7 | 0.07 | 1.00 | 1.33 |
| Common bladderwort | *Utricularia vulgaris* | 6 | 0.06 | 1.00 | 1.11 |
| Southern naiad | *Najas guadalupensis* | 3 | 0.03 | 1.00 | 0.67 |
| Grassy pondweed | *Potamogeton gramineus* | 6 | 0.03 | 0.60 | 0.67 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 2 | 0.02 | 1.00 | 0.44 |
| Illinois pondweed | *Potamogeton illinoiensis* | 3 | 0.02 | 0.67 | 0.44 |
| Bog bladderwort | *Utricularia geminiscapa* | 2 | 0.02 | 1.00 | 0.44 |
| Slender water weed | *Elodea nuttallii* | 1 | 0.01 | 1.00 | 0.22 |
| Slender naiad | *Najas flexilis* | 1 | 0.01 | 1.00 | 0.22 |
| Brittle naiad | *Najas minor* | 3 | 0.01 | 0.33 | 0.22 |
| Large-leaf pondweed | *Potamogeton amplifolius* | 3 | 0.01 | 0.33 | 0.22 |
| Small pondweed | *Potamogeton pusillus* | 1 | 0.01 | 1.00 | 0.22 |
| Humped bladderwort | *Utricularia gibba* | 1 | 0.01 | 1.00 | 0.22 |
| Eel grass | *Vallisneria americana* | 1 | 0.01 | 1.00 | 0.22 |
| Filamentous algae | *Algae* | 29 | | | |
| | | | | | |

| Common Name | Scientific Name | Site Frequency | Relative Density | Mean Density | Dominance |
|---|---|---|---|---|---|
| **Depth: 0-5 feet** | | | | | |
| Chara | *Chara spp.* | 97 | 1.21 | 1.25 | 24.14 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 10 | 0.24 | 2.33 | 4.83 |
| Sago pondweed | *Stuckenia pectinatus* | 21 | 0.21 | 1.00 | 4.14 |
| Common bladderwort | *Utricularia vulgaris* | 17 | 0.17 | 1.00 | 3.45 |
| Coontail | *Ceratophyllum demersum* | 7 | 0.14 | 2.00 | 2.76 |
| Spiny naiad | *Najas marina* | 13 | 0.14 | 1.00 | 2.76 |
| Grassy pondweed | *Potamogeton gramineus* | 3 | 0.03 | 1.00 | 0.69 |
| Bog bladderwort | *Utricularia geminiscapa* | 3 | 0.03 | 1.00 | 0.69 |
| Humped bladderwort | *Utricularia gibba* | 3 | 0.03 | 1.00 | 0.69 |
| Curly-leaf pondweed | *Potamogeton crispus* | 3 | 0.03 | 1.00 | 0.69 |
| Filamentous algae | *Algae* | 21 | | | |
| | | | | | |
| **Depth: 5-10 feet** | | | | | |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 26 | 1.15 | 4.43 | 22.96 |
| Chara | *Chara spp.* | 48 | 0.59 | 1.23 | 11.85 |
| Coontail | *Ceratophyllum demersum* | 22 | 0.44 | 2.00 | 8.89 |
| Sago pondweed | *Stuckenia pectinatus* | 26 | 0.26 | 1.00 | 5.19 |
| Spiny naiad | *Najas marina* | 15 | 0.15 | 1.00 | 2.96 |
| Common waterweed | *Elodea canadensis* | 11 | 0.11 | 1.00 | 2.22 |
| Curly-leaf pondweed | *Potamogeton crispus* | 11 | 0.11 | 1.00 | 2.22 |
| Grassy pondweed | *Potamogeton gramineus* | 7 | 0.07 | 1.00 | 1.48 |
| Illinois pondweed | *Potamogeton illinoiensis* | 7 | 0.07 | 1.00 | 1.48 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 4 | 0.04 | 1.00 | 0.74 |
| Slender naiad | *Najas flexilis* | 4 | 0.04 | 1.00 | 0.74 |
| Brittle naiad | *Najas minor* | 4 | 0.04 | 1.00 | 0.74 |
| Large-leaf pondweed | *Potamogeton amplifolius* | 4 | 0.04 | 1.00 | 0.74 |
| Small pondweed | *Potamogeton pusillus* | 4 | 0.04 | 1.00 | 0.74 |
| Bog bladderwort | *Utricularia geminiscapa* | 4 | 0.04 | 1.00 | 0.74 |
| Eel grass | *Vallisneria americana* | 4 | 0.04 | 1.00 | 0.74 |
| Filamentous algae | *Algae* | 33 | | | |
| | | | | | |

| Common Name | Scientific Name | Site Frequency | Relative Density | Mean Density | Dominance |
|---|---|---|---|---|---|
| **Depth: 10-15 feet** | | | | | |
| Coontail | *Ceratophyllum demersum* | 75 | 1.17 | 1.56 | 23.33 |
| Curly-leaf pondweed | *Potamogeton crispus* | 67 | 1.13 | 1.69 | 22.50 |
| Nitella | *Nitella* | 21 | 0.54 | 2.60 | 10.83 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 30 | 0.54 | 1.86 | 10.83 |
| Chara | *Chara spp.* | 13 | 0.13 | 1.00 | 2.50 |
| Southern naiad | *Najas guadalupensis* | 8 | 0.08 | 1.00 | 1.67 |
| Sago pondweed | *Stuckenia pectinatus* | 8 | 0.08 | 1.00 | 1.67 |
| Common waterweed | *Elodea canadensis* | 4 | 0.04 | 1.00 | 0.83 |
| Slender water weed | *Elodea nuttallii* | 4 | 0.04 | 1.00 | 0.83 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 4 | 0.04 | 1.00 | 0.83 |
| Filamentous algae | *Algae* | 25 | | | |
| | | | | | |
| **Depth: 15-20 feet** | | | | | |
| Nitella | *Nitella* | 50 | 0.40 | 8.00 | 1.00 |
| Sago pondweed | *Stuckenia pectinatus* | 40 | 0.30 | 6.00 | 1.00 |
| Coontail | *Ceratophyllum demersum* | 30 | 0.50 | 10.00 | 1.67 |
| Common waterweed | *Elodea canadensis* | 30 | 0.20 | 4.00 | 1.00 |
| Chara | *Chara spp.* | 20 | 0.40 | 8.00 | 2.00 |
| Southern naiad | *Najas guadalupensis* | 20 | 0.10 | 2.00 | 1.00 |
| Curly-leaf pondweed | *Potamogeton crispus* | 20 | 0.10 | 2.00 | 1.00 |
| Filamentous algae | *Algae* | 50 | | | |

**Table 9. Big Chapman Lake, post-treatment Tier II survey metrics and data, July 18, 2006.**

| | | | | | |
|---|---|---|---|---|---|
| County: | Kosciusko | Sites with plants: | 83.00 | Mean species/site: | 2.83 |
| Date: | 18-Jul-06 | Sites with native plants: | 83.00 | Mean native species/site: | 2.72 |
| Secchi (ft): | 7 | Number of species: | 17.00 | Species diversity: | 0.88 |
| Maximum plant depth: | 20 | Number of native species: | 15.00 | Native species diversity: | 0.86 |
| Trophic status: | mesotrophic | Maximum species/site: | 8.00 | Rake diversity: | 0.81 |
| Total number of sites: | 90 | | | Native rake diversity: | 0.79 |
| | | | | | |
| **All Depths (0-20 feet)** | | | | | |
| **Common Name** | **Scientific Name** | **Site Frequency** | **Relative Density** | **Mean Density** | **Dominance** |
| Chara | *Chara spp.* | 46 | 1.26 | 2.76 | 25.11 |
| Coontail | *Ceratophyllum demersum* | 40 | 0.73 | 1.83 | 14.67 |
| Sago pondweed | *Stuckenia pectinatus* | 26 | 0.28 | 1.09 | 5.56 |
| Spiny naiad | *Najas marina* | 20 | 0.29 | 1.44 | 5.78 |
| Eel grass | *Vallisneria americana* | 16 | 0.16 | 1.00 | 3.11 |
| Nitella | *Nitella* | 13 | 0.20 | 1.50 | 4.00 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 11 | 0.21 | 1.90 | 4.22 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 9 | 0.11 | 1.25 | 2.22 |
| Common waterweed | *Elodea canadensis* | 7 | 0.07 | 1.00 | 1.33 |
| Common bladderwort | *Utricularia vulgaris* | 7 | 0.07 | 1.00 | 1.33 |
| Grassy pondweed | *Potamogeton gramineus* | 6 | 0.06 | 1.00 | 1.11 |
| Curly-leaf pondweed | *Potamogeton crispus* | 4 | 0.04 | 1.00 | 0.89 |
| Southern naiad | *Najas guadalupensis* | 2 | 0.02 | 1.00 | 0.44 |
| Large-leaf pondweed | *Potamogeton amplifolius* | 1 | 0.01 | 1.00 | 0.22 |
| Broad-leaf small pondweed | *Potamogeton berchtoldii* | 1 | 0.01 | 1.00 | 0.22 |
| Illinois pondweed | *Potamogeton illinoiensis* | 1 | 0.01 | 1.00 | 0.22 |
| Long-leaf pondweed | *Potamogeton nodosus* | 1 | 0.01 | 1.00 | 0.22 |
| Filamentous algae | *Algae* | 73 | | | |
| | | | | | |

| Common Name | Scientific Name | Site Frequency | Relative Density | Mean Density | Dominance |
|---|---|---|---|---|---|
| **Depth: 0-5 feet** | | | | | |
| Chara | *Chara spp.* | 93 | 2.93 | 3.15 | 58.62 |
| Coontail | *Ceratophyllum demersum* | 31 | 0.31 | 1.00 | 6.21 |
| Spiny naiad | *Najas marina* | 31 | 0.31 | 1.00 | 6.21 |
| Eel grass | *Vallisneria americana* | 24 | 0.24 | 1.00 | 4.83 |
| Sago pondweed | *Stuckenia pectinatus* | 21 | 0.21 | 1.00 | 4.14 |
| Grassy pondweed | *Potamogeton gramineus* | 14 | 0.14 | 1.00 | 2.76 |
| Common bladderwort | *Utricularia vulgaris* | 14 | 0.14 | 1.00 | 2.76 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 14 | 0.24 | 1.75 | 4.83 |
| Common waterweed | *Elodea canadensis* | 7 | 0.07 | 1.00 | 1.38 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 3 | 0.03 | 1.00 | 0.69 |
| Southern naiad | *Najas guadalupensis* | 3 | 0.03 | 1.00 | 0.69 |
| Large-leaf pondweed | *Potamogeton amplifolius* | 3 | 0.03 | 1.00 | 0.69 |
| Filamentous algae | *Algae* | 79 | | | |
| | | | | | |
| **Depth: 5-10 feet** | | | | | |
| Sago pondweed | *Stuckenia pectinatus* | 56 | 1.00 | 1.13 | 20.00 |
| Chara | *Chara spp.* | 44 | 1.53 | 2.17 | 30.59 |
| Coontail | *Ceratophyllum demersum* | 37 | 1.18 | 2.00 | 23.53 |
| Spiny naiad | *Najas marina* | 30 | 0.94 | 2.00 | 18.82 |
| Northern watermilfoil | *Myriophyllum exalbescens* | 26 | 0.53 | 1.29 | 10.59 |
| Eel grass | *Vallisneria americana* | 26 | 0.41 | 1.00 | 8.24 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 19 | 0.65 | 2.20 | 12.94 |
| Common bladderwort | *Utricularia vulgaris* | 7 | 0.12 | 1.00 | 2.35 |
| Common waterweed | *Elodea canadensis* | 4 | 0.06 | 1.00 | 1.18 |
| Nitella | *Nitella* | 4 | 0.06 | 1.00 | 1.18 |
| Curly-leaf pondweed | *Potamogeton crispus* | 4 | 0.06 | 1.00 | 1.18 |
| Grassy pondweed | *Potamogeton gramineus* | 4 | 0.06 | 1.00 | 1.18 |
| Illinois pondweed | *Potamogeton illinoiensis* | 4 | 0.06 | 1.00 | 1.18 |
| Long-leaf pondweed | *Potamogeton nodosus* | 4 | 0.06 | 1.00 | 1.18 |
| Filamentous algae | *Algae* | 78 | | | |

| Common Name | Scientific Name | Site Frequency | Relative Density | Mean Density | Dominance |
|---|---|---|---|---|---|
| **Depth: 10-15 feet** | | | | | |
| Coontail | *Ceratophyllum demersum* | 65 | 1.52 | 2.33 | 30.43 |
| Nitella | *Nitella* | 35 | 0.52 | 1.50 | 10.43 |
| Common waterweed | *Elodea canadensis* | 13 | 0.13 | 1.00 | 2.61 |
| Curly-leaf pondweed | *Potamogeton crispus* | 13 | 0.13 | 1.00 | 2.61 |
| Chara | *Chara spp.* | 9 | 0.09 | 1.00 | 1.74 |
| Sago pondweed | *Stuckenia pectinatus* | 9 | 0.09 | 1.00 | 1.74 |
| Southern naiad | *Najas guadalupensis* | 4 | 0.04 | 1.00 | 0.87 |
| Spiny naiad | *Najas marina* | 4 | 0.04 | 1.00 | 0.87 |
| Broad-leaf small pondweed | *Potamogeton berchtoldii* | 4 | 0.04 | 1.00 | 0.87 |
| Filamentous algae | *Algae* | 83 | | | |
| | | | | | |
| **Depth: 15-20 feet** | | | | | |
| Nitella | *Nitella* | 30 | 0.50 | 1.67 | 10.00 |
| Coontail | *Ceratophyllum demersum* | 20 | 0.20 | 1.00 | 4.00 |
| Eurasian watermilfoil | *Myriophyllum spicatum* | 10 | 0.10 | 1.00 | 2.00 |
| Filamentous algae | *Algae* | 30 | | | |

During the pre-treatment survey of Big Chapman Lake, chara, Eurasian watermilfoil, coontail, and curly-leaf pondweed were the most prevalent species identified in Big Chapman Lake during the pre-treatment survey. Chara was dominant over all depths (12.89), had the greatest site frequency (present at 45 of 90 surveyed sites), and had the highest relative density (0.64) of all plant species present (Table 7). Chara also dominated the 0-5 and 15-20 foot strata. Over all depths, Eurasian water milfoil possessed a greater mean density (3.00) than other plant species present in the Tier II pre-treatment survey. Eurasian watermilfoil was most dominant in the 5-10 foot stratum. Coontail dominated the 10-15 foot strata. Nitella, which is adapted to low light and high pressure conditions, was present at only 10 feet or greater water depth and dominated the 15-20 foot stratum of the water column. Curly-leaf pondweed was also present in moderate abundance in the 5-10 and 15-20 foot strata. Figures 4 through 6 document sampling locations (Figure 4) and sites where Eurasian watermilfoil (Figure 5) and curly-leaf pondweed (Figure 6) were identified during the pre-treatment survey.

Following treatment, chara was still the most abundant species in Big Chapman Lake and was present at 46% of the sites. Chara possessed the greatest relative and mean densities on average for all strata throughout the water column. Coontail also remained abundant and was present at 40% of the sample sites. Eurasian watermilfoil site abundance decreased from the pre-treatment to post treatment surveys. Eurasian watermilfoil was found at 19% of the sites during the pre-treatment survey and at only 11% of sites post-treatment. Both average relative density and average mean density of Eurasian watermilfoil also decreased as compared to pre-treatment values. However, Eurasian watermilfoil site abundance increased from 10% to 14% in the 0-5 foot strata and from 0% to 10% in the 15-20 foot strata. Curly-leaf pondweed was identified at only 4% of sites during the post-treatment compared to 26% of sites during the pre-treatment survey. Figures 7-9 detail plant sampling locations (Figure 7) and the locations where Eurasian watermilfoil (Figure 8) and curly-leaf pondweed (Figure 10) were identified during the post-treatment surveys.

When compared with data collected by Pearson (2004), Big Chapman Lake possessed more than double the average diversity observed in the lakes surveyed by Pearson (Table. 6). Big Chapman Lake possessed 21 species during the pre-treatment survey and 17 species in the post-treatment survey, while Pearson collected eight species on average. Big Chapman Lake also possessed more native species (19 compared to Pearson's 7) and greater rake diversity (0.94 and 0.81 for pre- and post-treatment respectively compared with 0.62 by Pearson). However, overall Big Chapman Lake possessed poorer mean rake density. As mentioned earlier, caution is warrented when using comparisons to Pearson's data for the purpose of making management decisions as the design of Pearson's study was not intended for the establishment of baseline data.

**Table 10. A comparison of the aquatic plant community in Big Chapman Lake with the average values for plant community metrics found by Pearson (2004) in his survey of 21 northern Indiana lakes that ranged from 12 to 774 surface acres in size with maximum littoral depths from 0.7 to 23.3 ft.**

| | Big Chapman Lake | | Indiana Average |
|---|---|---|---|
| | Pre-treatment (5/22/06) | Post-treatment (7/18/06) | 2004 |
| Percentage of littoral sites containing plants | - | - | - |
| Number of species collected | 21 | 17 | 8 |
| Number of native species collected | 19 | 15 | 7 |
| Mean Rake density | 1.72 | - | 3.3 |
| Rake Diversity (SDI) | 0.94 | 0.81 | 0.62 |
| Native Rake Diversity (SDI) | 0.87 | 0.79 | 0.5 |
| Species Richness (Avg # species/site) | 3.28 | 2.83 | 1.61 |
| Native Species Richness | - | 2.72 | 1.33 |
| Site Species Diversity | 0.9 | 0.88 | 0.66 |
| Site Species native diversity | 0.88 | 0.86 | 0.56 |

**Aquatic Vegetation Sampling Discussion**

The primary focus of an aquatic vegetation management plan is to document changes within the aquatic plant community pre- and post-treatment and to develop plans for future work. Eurasian watermilfoil and curly-leaf pondweed were the two exotic species targeted in the herbicide treatment that occurred on May 24, 2006. Both Big and Little Chapman Lake underwent a decrease in both the relative density and site abundance of curly-leaf pondweed. However, the true impact of the treatment on curly-leaf pondweed populations remains elusive as curly-leaf pondweed density naturally declines in the summer due to increased water temperatures. The treatment of Eurasian watermilfoil resulted in less dramatic decreases in the relative density and in site frequency of Eurasian watermilfoil in Big Chapman Lake and site frequency of Eurasian watermilfoil in Little Chapman Lake. The relative density of Eurasian watermilfoil in Little Chapman Lake increased slightly from 0.24 to 0.30. As discussed earlier, the applicator attributed the poor response of Eurasian watermilfoil to treatment to small application areas (See Section 7).

A trend relating the response of the native plant community to herbicide application in both Little and Big Chapman Lake suggests the following: the treatment on May 24, 2006 resulted in an initial decrease in site abundance and relative density of the plant community (as observed in the Tier II conducted by the DNR on May 30, 2006) only to rebound to densities and abundances greater than pre-treatment values. At first glance, it would be easy to attribute this rebounding of the plant community as a response to the selective removal of two competitors (Eurasian watermilfoil and curly-leaf pondweed); however, a plethora of seasonal and temporal variables make it impossible to prove a cause and effect relationship. One variable, which may be masking the true effect of the herbicide application, is the seasonal variation in plant biomass as the Tier II survey conducted by JFNew occurred in late July, which is the expected time of peak seasonal biomass (Pearson, 2004). Other temporal variables that may be impacting upon plant bed composition include increased boat traffic, predation, and physical stressors such as increased temperatures as the season progressed. Additionally, natural variations of the plant community throughout the littoral zone may also explain the initial decline as the IDNR used different survey points than those used by JFNew.

Figures 1-10 in Appendix B illustrate changes in the percent abundance of plants comprising more than 15% of the plant community present in Little Chapman Lake through three growing seasons (2004-2006). Figures 1-14 in Appendix C illustrate how plants comprising more than 15% of Big Chapman Lake's plant community have changed through three growing seasons (2004-2006).

### 8.3 Macrophyte Inventory Discussion

Since we cannot account for all the spatial variables impacting the plant community, such as boat-traffic and changes in nutrient availability, or for temporal variables like climactic conditions, like temperature and precipitation levels, an exact and precise analysis regarding the impact of herbicide treatment upon the Chapman Lakes' aquatic plant communities are not possible. Still, general trends emerge from the data that are useful for the purpose of management decisions. When comparing Eurasian watermilfoil site frequency for spring surveys, it appears that Eurasian watermilfoil site frequency declined so that 2006 site frequencies are less than those calculated in 2005 (Appendix B: Figure 1; Appendix C: Figure 1). Table 11 details changes in the site frequestncy, relative and mean density, and dominance of Eurasian watermilfoil and curly-leaf pondweed from 2004 to 2006 within Big and Little Chapman Lakes.

**Table 11. Variation in site frequency, relative and mean density, and dominance of Eurasian watermilfoil and curly-leaf pondweed within Big and Little Chapman Lakes from 2004 to 2006.**

| Common Name | Date | Site Frequency | Relative Density | Mean Density | Dominance |
|---|---|---|---|---|---|
| **Little Chapman Lake:** Eurasian watermilfoil | 8/26/04 | 50.5 | 0.950 | 1.00 | 19.0 |
| | 5/16/05 | 56.0 | 0.76 | 1.36 | 15.2 |
| | 8/3/05 | 31.0 | 0.50 | 1.62 | 10.0 |
| | 8/10/05 | 20.0 | 0.28 | 1.42 | 5.67 |
| | 5/22/06 | 24.0 | 0.24 | 1.00 | 4.80 |
| | 7/18/06 | 18.0 | 0.30 | 1.67 | 6.00 |
| **Little Chapman Lake:** Curly-leaf pondweed | 5/16/05 | 28.0 | 0.40 | 1.43 | 8.0 |
| | 8/3/05 | 2.4 | 0.02 | 1.00 | 0.5 |
| | 8/10/05 | 5.0 | 0.05 | 1.00 | 1.00 |
| | 5/22/06 | 16.0 | 0.16 | 1.00 | 3.20 |
| | 7/18/06 | 4.0 | 0.04 | 1.00 | 0.80 |
| **Big Chapman Lake:** Eurasian watermilfoil | 8/26/04 | 23.1 | 0.33 | 1.53 | 6.7 |
| | 5/16/05 | 38.6 | 1.01 | 2.62 | 20.2 |
| | 8/3/05 | 14.9 | 0.34 | 2.27 | 6.7 |
| | 8/10/05 | 19.3 | 0.47 | 2.60 | 9.40 |
| | 5/22/06 | 18.9 | 0.57 | 3.00 | 11.33 |
| | 7/18/06 | 11.1 | 0.21 | 1.90 | 4.22 |
| **Big Chapman Lake:** Curly-leaf pondweed | 8/26/04 | 7.7 | 0.08 | 1.20 | 1.5 |
| | 5/16/05 | 21.8 | 0.37 | 1.68 | 7.3 |
| | 8/3/05 | 3.0 | 0.04 | 1.33 | 0.8 |
| | 8/10/05 | 4.8 | 0.04 | 1.00 | 0.72 |
| | 5/22/06 | 25.6 | 0.38 | 1.48 | 7.56 |
| | 7/18/06 | 4.4 | 0.04 | 1.00 | 0.89 |

Review of the site frequency and relative densities of curly-leaf pondweed in Big Chapman Lake (Appendix B; Figure 3-4), data indicated little change in 2005 and 2006 populations. As discussed earlier, a probable explanation for this lack of response to treatment is that both year's treatments occurred too late in the season: turions had already formed, thus ensuring the following year's population. However, this hypothesis conflicts with the successful treatment of curly-leaf pondweed that occurred simultaneously in Little Chapman Lake (Appendix B; Figure 3-4). The difference in response to treatment for Big and Little Chapman Lake are at this time unclear.

It is difficult to determine how the native aquatic plant communities within the Chapman Lakes are responding to herbicide treatment as we only have six data sets spanning three growing seasons. With this limited data set, we can comment only on variations in the plant community. It should be noted that variations can occur for many reasons and that observations included hereafter are just that. They may suggest trends, but are inconclusive at this time. To further distort the picture some plants, such as sago pondweed, appear to have nearly doubled in site abundance and relative density over a period of one week during the peak of growing season (Appendix C; Figure 13-14). Nonetheless, it appears that some native plants are decreasing in frequency and density while others are increasing. Coontail in Big Chapman Lake appears to have increased in site abundance and density from 2004 to 2006 (Appendix C; Figure 7-8) while coontail decreased in Little Chapman Lake during that same time period (Appendix B; Figure 5-6). Eel grass tends to have declined in site abundance and relative density in both Big and Little Chapman Lakes from 2004 to 2006 (Appendix B and Appendix C; Figure 7-8 and Figure 11-12 respectively). The aforementioned variance observed in aquatic plant populations from 2004 to 2006 may be a consequence of the natural rise and fall of population size over time. However, at this time we have insufficient data to confirm this.

## 9.0 Aquatic Vegetation Management Alternatives

No new aquatic vegetation management alternatives are available for discussion that have not been covered by previous plans. Consult the original aquatic plant management plan completed by CLF in 2004 for more information on management alternatives.

## 10.0 Public Involvement

The LARE biologist, district fisheries biologist, association representative, and a representative from the contracted herbicide applicator met November 2, 2006 to discuss the 2006 aquatic plant treatment and identify aquatic plant treatment options for 2007. From this meeting, it was determined that the following would occur:

1. All areas identified as possessing dense Eurasian watermilfoil beds should be treated in 2007.
2. Efforts to adequately catalog the curly-leaf pondweed community with early season surveys should also occur.
3. If it is deemed necessary and of high priority for Chapman Lakes residents, then a plan for treatment of curly-leaf pondweed should be instituted based on the early season 2007 surveys.

Based on this information, a grant application to treat Eurasian watermilfoil will be submitted to the LARE program staff. The CLCA will determine how to and contract for curly-leaf pondweed work independent of the LARE program. Although LARE aquatic plant treatment funds are limited, future efforts are targeted at accommodating early-season curly-leaf pondweed treatments. Money may be available for curly-leaf pondweed treatment in the future.

The public meeting for the aquatic plant management plan occurred in concert with a series of other meetings on July 8, 2006. During this larger meeting, the LARE program in general and the aquatic plant management program specifically were discussed. Attendees were polled for their thoughts on previous aquatic plant management treatments within the Chapman Lakes. Additionally, results of the initial aquatic plant survey were presented and the outline of future activities associated with aquatic plant treatment within the Chapman Lakes were laid out. A majority of attendants representing the Chapman Lakes indicated that aquatic plant control in the future was both necessary and beneficial. Many felt that treatment should continue while a limited number (<10%) indicated the desire for a whole lake treatment to control exotic species.

## 11.0 Public Education

Future public education efforts associated with the Chapman Lakes Aquatic Plant Management Plan follow efforts identified during completion of the Chapman Lakes Strategic Lakes Management Plan. These items are not repeated herein. Rather individuals should refer to the SLMP for more information (CLCA and JFNew, draft plan, 2006).

In addition to current education plans, individuals should be educated on the need or lack thereof of a whole-lake fluoridone treatment. Although some Chapman Lakes residents desire a whole-lake treatment, this treatment methodology is not warranted at this time for two main reasons: limitation of fund availability and adequacy of spot treatment for controlling Eurasian watermilfoil in the Chapman Lakes. LARE funding for aquatic plant treatment is limited; therefore, only lakes where Eurasian watermilfoil is pervasive warrant whole lake treatments through this program. Many lakes contain higher densities and larger surface acreages of Eurasian watermilfoil than the Chapman Lakes. Eurasian watermilfoil is limited to several small locations within Big and Little Chapman Lakes. If these areas are treated correctly using spot treatments, then Eurasian watermilfoil will become and even smaller problem. Spot treatments have been successful in eradicating Eurasian watermilfoil in lakes with similarly-sized Eurasian watermilfoil populations (Nate Long, Aquatic Control, personal communication). It is necessary to control the reintroduction of Eurasian watermilfoil from the channels located around the Chapman Lakes in order for spot treatment to be effective in overall Eurasian watermilfoil control.

Finally, education efforts targeting information about Indiana's newest aquatic species of concern hydrilla, which was identified in Lake Manitou (Fulton County) in 2006. Hydrilla is an extremely aggressive submerged aquatic plant species that looks similar to common elodea. The basic difference is the number of leaves: hydrilla contains five leaves while common elodea only contains three leaves. Appendix D contains more detailed information non hydrilla, its habitat, and its distribution. Efforts to education individuals on the control, spread, and issues associated with this and other exotic species should follow the Stop the Hitchhikers! Campaign which can be found at www.protectyourwaters.net. At a minimum, the CLCA and CLF should post warnings and send information to Chapman Lakes' residents about this plant.

## 12.0 Integrated Management Action Strategy

Post-treatment surveys suggest that Eurasian watermilfoil is still a concern in several areas throughout the Chapman Lakes. Treatment of all areas of Eurasian watermilfoil identified in Figure 3 is recommended for 2007. This includes approximately 25 acres of Eurasian watermilfoil treatment. Eurasian watermilfoil should be treated with 2, 4-D at a rate determined during the 2007 pre-treatment assessment (Nate Long, Aquatic Control, personal communication). Permit applications for aquatic plant treatment within Big and Little Chapman Lakes are included in

Appendix E. In areas less than 5 acres in size, granular rather liquid herbicide should be used in order to generate adequate coverage and targeted treatment rates. Additionally, it is recommended that the CLCA coordinate assessment of the channels along the northern shoreline of Little Chapman Lake, between the lakes, and along Big Chapman Lake's eastern and northern shorelines and within Nellie's Bay. Once it is determined whether these areas are acting as nurseries for Eurasian watermilfoil, a successful plan to reduce the growth of this species in these locations should be identified. Finally, it is recommended that the CLCA pursue early season assessment and treatment for curly-leaf pondweed. These assessments should occur when water temperatures are at 30 to 40° F so that treatment may occur within this water temperature range as well. The past years' curly-leaf pondweed treatments have been largely unsuccessful in controlling the plant. Rather these efforts have simply treated the symptom. Treatments have shortened the timeframe in which curly-leaf pondweed falls out of the water column and have done little to actually reduce or control the population.

## 13.0 Project Budget

Costs for aquatic plant assessment and treatment in 2007 are as follows:

- Eurasian watermilfoil treatment of approximately 25 acres at a cost of $325 per acre for a total cost of $8,125.
- Early season curly-leaf pondweed assessment and treatment. Assessment will cost approximately $1,800. Treatment costs will depend upon the acreage identified for treatment. Based on previous years' treatments, it is anticipated that 10 to 25 acres of curly-leaf pondweed treatment with Aquathol K will be necessary. Cost estimates will be developed based on the area to be treated and the chemical to be utilized.
- Channel assessment for Eurasian watermilfoil and curly-leaf pondweed should be accomplished under the early season assessment identified above and the standard LARE aquatic plant management planning assessments. Therefore, no additional costs are identified herein.
- Standard LARE assessment, public meeting, and plan update costs are based on 2007 LARE requirements (pre-treatment exotic species distribution survey; one post-treatment Tier II survey; public meeting; plan update). Assessment costs are estimated to total $7,500, while the plan update is anticipated to occur as a cost of $4,255.

Total fees for 2007 aquatic plant assessment, herbicide application, and plan updated are estimated at $21,680. This does not include cost for curly-leaf pondweed treatment.

The following time schedule is anticipated for aquatic plant management activities for the Chapman Lakes in 2007:

| | |
|---|---|
| March-April 2007 | Curly-leaf pondweed assessment |
| April-early May, 2007 | Curly-leaf pondweed treatment outside of the LARE program |
| May 15-June 15, 2007 | Tier I assessment (*must occur prior to LARE-funded treatment) |
| May 15-June 15, 2007 | LARE-funded aquatic plant treatment |
| July 15-August 30, 2007 | Tier I and Tier II post-treatment assessment |
| August-September, 2007 | Public meeting |
| November 2007 | Meeting between IDNR LARE and fisheries staff, CLCA, and contractor |
| December 15, 2007 | Plan update and permit and LARE application for 2008 funding due |

## 14.0 Monitoring and Plan Update Procedures

Monitoring shall follow procedures determined by the LARE program. Likewise, plan updates will conform to LARE requirements. Additional monitoring may occur outside of the LARE program. This could include, but is not limited to: early season assessment and treatment for curly-leaf pondweed, assessment and treatment of channel areas to limit Eurasian watermilfoil regrowth, and CLCA Scientific-funded aquatic plant assessments. As these items are not part of the LARE program, their inclusion in any future LARE aquatic plant management plan updates is not required; however, their inclusion is suggested as a mechanism to contain all pertinent aquatic plant management information in one location and deal with changes in community and treatment requirements at one time even if all actions are not funded through the LARE program.

## 15.0 References Cited

Chapman Lakes Foundation. 2004. Chapman Lakes Aquatic Vegetation Management Plan. Indiana Department of Natural Resources, Division of Soil Conservation, Indianapolis, Indiana.

Indiana Department of Natural Resources. 2006a. Tier I aquatic vegetation survey protocol. Indianapolis, Indiana.

Indiana Department of Natural Resources. 2006b. Tier II aquatic vegetation survey protocol. Indianapolis, Indiana.

Pearson, J. 2004. A sampling method to assess occurrence, abundance and distribution of submersed aquatic plants in Indiana lakes. Indiana Department of Natural Resources, Division of Fish and Wildlife, Indianapolis, Indiana.

Pearson, J. 2005a. Big Chapman Lake Fish Management Report. Indiana Department of Natural Resources, Division of Fish and Wildlife, Indianapolis, Indiana.

Pearson, J. 2005b. Little Chapman Lake Fish Management Report. Indiana Department of Natural Resources, Division of Fish and Wildlife, Indianapolis, Indiana.

# APPENDIX A:

# TIER I SURVEY DATASHEETS AND TIER II SURVEY DATA

# CHAPMAN LAKES
# AQUATIC PLANT MANAGEMENT PLAN UPDATE

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

**ORGANIZATION: JFNew** | **DATE: 7/18/06**

| SITE INFORMATION | | | | | SITE COORDINATES |
|---|---|---|---|---|---|
| **Plant Bed ID: 01** | Waterbody Name: Little Chapman | | | | Center of the Bed |
| Bed Size: 4.0 | | | | | Latitude: 601164 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4570230 Easting |
| Marl? | Total # of Species: 21 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:3 | N:1 | F:3 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| CHARA | 1 | | | |
| DECVER | 1 | | | |
| ELOCAN | 1 | | | |
| FILALG | 1 | | | |
| LEMMIN | 2 | | | |
| LEMTRI | 1 | | | |
| MYRSPI | 3 | | | |
| NAJFLE | 1 | | | |
| NAJGUA | 1 | | | |
| NUPADV | 2 | | | |
| NYMTUB | 2 | | | |
| PHAARU | 1 | | | |
| POLLAP | 1 | | | |
| POTAMP | 1 | | | |
| POTPUS | 2 | | | |
| POTZOS | 1 | | | |
| SPIPOL | 1 | | | |
| STUPEC | 2 | | | |
| TYPANG | 1 | | | |
| VALAME | 2 | | | |
| WOLCOL | 1 | | | |
| | | | | |

**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**Abundance:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
**0 =** as defined
**1** = Species suspe
**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 02** | Waterbody Name: Little Chapman | | | | Center of the Bed |
| Bed Size: 19.9 | | | | | Latitude: 6015480 Northing |
| Substrate: 2 | Waterbody ID: | | | | Longitude: 4569740 Easting |
| Marl? | Total # of Species: 14 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:2 | N:1 | F:7 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| CHARA | 2 | | | |
| FILALG | 1 | | | |
| LEMMIN | 1 | | | |
| MYRSPI | 1 | | | |
| NAJFLE | 1 | | | |
| NUPADV | 1 | | | |
| NYMTUB | 1 | | | |
| POTGRA | 1 | | | |
| POTPED | 1 | | | |
| POTPRA | 1 | | | |
| SCIPUN | 1 | | | |
| TYPANG | 1 | | | |
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**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**Abundance:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
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**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 03 (1)** | Waterbody Name: Little Chapman | | | | Center of the Bed |
| Bed Size: 32.2 | | | | | Latitude: 600953 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4569620 Easting |
| Marl? | Total # of Species: 25 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:3 | N:1 | F:3 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| ACESAI | 1 | | | |
| ASCINC | 1 | | | |
| BOECYC | 1 | | | |
| CERDEM | 3 | | | |
| CIRARV | 1 | | | |
| DECVER | 1 | | | |
| DRYTHP | 1 | | | |
| FILALG | 3 | | | |
| HIBPAL | 1 | | | |
| IMPCAP | 1 | | | |
| LEMMIN | 1 | | | |
| LYTSAL | 1 | | | |
| MYREXA | 1 | | | |
| MYRSPI | 2 | | | |
| NUPADV | 2 | | | |
| NUPVAR | 1 | | | |
| NYMTUB | 2 | | | |
| PHAARU | 1 | | | |
| POTPEC | 2 | | | |
| SAMCAN | 1 | | | |
| SOLCUL | 1 | | | |
| SPIPOL | 1 | | | |

**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**Abundance:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
**0 =** as defined
**1** = Species suspe
**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 03 (2)** | Waterbody Name: Little Chapman | | | | Center of the Bed |
| Bed Size: | | | | | Latitude: 600953 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4569620 Easting |
| Marl? | Total # of Species 24 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:3 | N:1 | F:3 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| TYPANG | 1 | | | |
| URTPRO | 1 | | | |
| VALAME | 2 | | | |
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**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**Abundance:**
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**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
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**1** = Species suspe
**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 01 (1)** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 95 | | | | | Latitude: 601696 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4570850 Easting |
| Marl? | Total # of Species: 35 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:4 | N:1 | F:3 | E:3 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| ASCINC | 1 | | | |
| CHARA | 4 | | | |
| CICBUL | 1 | | | |
| CLAMAR | 1 | | | |
| DECVER | 1 | | | |
| ELOCAN | 1 | | | |
| FILALG | 1 | | | |
| HIBPAL | 1 | | | |
| LEEORY | 1 | | | |
| LEMMIN | 1 | | | |
| LYTSAL | 1 | | | |
| MYRHET | 1 | | | |
| MYRSPI | 2 | | | |
| NAJGUA | 1 | | | |
| NAJMAR | 3 | | | |
| NITELLA | 1 | | | |
| NUPADV | 2 | | | |
| NYMTUB | 2 | | | |
| PHAARU | 1 | | | |
| PONCOR | 1 | | | |
| POTAMP | 1 | | | |
| POTCRI | 1 | | | |

**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
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**S =** Submersed

**Canopy:**
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**2** = 2-20%
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**4** = > 60%

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**2** = 2-20%
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**4** = > 60%

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**1** = Species suspe
**2** = Genus suspected
**3** = Unknown

**Voucher:**
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**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 01 (2)** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 95 | | | | | Latitude: 601696 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4570850 Easting |
| Marl? | Total # of Species: 35 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:4 | N:1 | F:3 | E:3 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| POTGRA | 2 | | | |
| POTILL | 2 | | | |
| POTNOD | 1 | | | |
| POTPEC | 3 | | | |
| POTPUS | 1 | | | |
| POTZOS | 2 | | | |
| SCIACU | 3 | | | |
| SCIPUN | 2 | | | |
| SOLCUL | 1 | | | |
| SPIPOL | 1 | | | |
| TYPANG | 1 | | | |
| UTRVUL | 1 | | | |
| VALAME | 2 | | | |
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**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

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**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 02** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 6.4 | | | | | Latitude: 601460 Northing |
| Substrate: | Waterbody ID: | | | | Longitude: 4570940 Easting |
| Marl? | Total # of Species: 8 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:3 | N:1 | F:1 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| CHARA | 3 | | | |
| MYREXA | 1 | | | |
| NAJMAR | 2 | | | |
| POTGRA | 1 | | | |
| POTPEC | 1 | | | |
| UTRGEM | 1 | | 1 | |
| UTRVUL | 1 | | | |
| VALAME | 1 | | | |
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**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
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**3** = 21-60%
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**Abundance:**
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**4** = > 60%

**QE Code:**
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**1** = Species suspe
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**3** = Unknown

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**1** = Taken, not varified
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**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 03 (1)** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 1.3 | | | | | Latitude: 600474 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4571080 Easting |
| Marl? | Total # of Species: 22 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:4 | N:1 | F:1 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| CERDEM | 2 | | | |
| CHARA | 4 | | | |
| ELOCAN | 2 | | | |
| FILALG | 1 | | | |
| LEMMIN | 1 | | | |
| MYRSPI | 2 | | | |
| NAJFLE | 2 | | | |
| NAJGUA | 2 | | | |
| NAJMAR | 3 | | | |
| NITELLA | 2 | | | |
| NYMTUB | 1 | | | |
| POTAMP | 1 | | | |
| POTCRI | 1 | | | |
| POTFOL | 1 | | | |
| POTGRA | 3 | | | |
| POTILL | 2 | | | |
| POTNOD | 1 | | | |
| POTPEC | 2 | | | |
| POTPRA | 1 | | | |
| POTZOS | 1 | | | |
| SCIACU | 1 | | | |
| SCIPUN | 1 | | | |

**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**Abundance:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
**0 =** as defined
**1** = Species suspe
**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 03 (2)** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 1.3 | | | | | Latitude: 600474 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4571080 Easting |
| Marl? | Total # of Species: 22 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:4 | N:1 | F:1 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| UTRVUL | 1 | | | |
| VALAME | 2 | | | |
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**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
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**S =** Submersed

**Canopy:**
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**3** = 21-60%
**4** = > 60%

**Abundance:**
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**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
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**2** = Genus suspected
**3** = Unknown

**Voucher:**
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**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 04** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 5.1 | | | | | Latitude: 600796 Northing |
| Substrate: | Waterbody ID: | | | | Longitude: 4571280 Easting |
| Marl? | Total # of Species: 15 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:3 | N:1 | F:1 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| ASCINC | 1 | | | |
| CERDEM | 1 | | | |
| CHARA | 1 | | | |
| DECVER | 1 | | | |
| ELOCAN | 1 | | | |
| LYTSAL | 1 | | | |
| MYREXA | 1 | | | |
| MYRSPI | 3 | | | |
| NAJGRA | 1 | | 1 | |
| NITELLA | 1 | | | |
| NYMTUB | 1 | | | |
| PHAARU | 1 | | | |
| POTILL | 1 | | 1 | |
| POTPEC | 1 | | | |
| TYPANG | 1 | | | |
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**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**Abundance:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
**0 =** as defined
**1** = Species suspe
**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 05** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 105.4 | | | | | Latitude: 601020 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4571220 Easting |
| Marl? | Total # of Species: 24 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:4 | N:1 | F:2 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| CHARA | 3 | | | |
| DECVER | 1 | | | |
| ELOCAN | 1 | | | |
| FILALG | 1 | | | |
| LYTSAL | 1 | | | |
| MYRSPI | 3 | | | |
| NAJMAR | 2 | | | |
| MITELLA | 1 | | | |
| NUPADV | 1 | | | |
| NYMTUB | 1 | | | |
| PONCOR | 2 | | | |
| POTGRA | 2 | | | |
| POTILL | 2 | | | |
| POTPEC | 2 | | | |
| POTPRA | 1 | | 1 | |
| SAGLAT | 1 | | | |
| SCIACU | 1 | | | |
| SCIPUN | 1 | | | |
| TYPANG | 1 | | | |
| TYPLAT | 1 | | | |
| UTRVUL | 1 | | | |
| VALAME | 1 | | | |

**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**Abundance:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
**0 =** as defined
**1** = Species suspe
**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 06 (1)** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 21.9 | | | | | Latitude: 601807 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4572170 Easting |
| Marl? | Total # of Species: 27 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:4 | N:1 | F:3 | E:2 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| ASCINC | 1 | | | |
| CHARA | 3 | | | |
| DECVER | 1 | | | |
| FILALG | 1 | | | |
| HETDUB | 1 | | | |
| HIBPAL | 1 | | | |
| LEMMIN | 1 | | | |
| LYTSAL | 1 | | | |
| MYREXA | 1 | | | |
| MYRSPI | 2 | | | |
| NAJGRA | 1 | | | |
| NAJMAR | 1 | | | |
| NITELLA | 2 | | | |
| NUPADV | 2 | | | |
| NYMTUB | 2 | | | |
| PONCOR | 1 | | | |
| POTAMP | 1 | | | |
| POTCRI | 1 | | | |
| POTGRA | 2 | | | |
| POTILL | 1 | | | |
| POTNOD | 1 | | | |
| POTPEC | 2 | | | |

**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**Abundance:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
**0 =** as defined
**1** = Species suspe
**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 06 (2)** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 21.9 | | | | | Latitude: 601807 Northing |
| Substrate: 3 | Waterbody ID: | | | | Longitude: 4572170 Easting |
| Marl? | Total # of Species: 27 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:4 | N:1 | F:3 | E:2 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| SCIACU | 1 | | | |
| SCIPUN | 1 | | | |
| TYPANG | 1 | | | |
| UTRVUL | 1 | | | |
| VALAME | 2 | | | |
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**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
**E** = Emergent
**S =** Submersed

**Canopy:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**Abundance:**
**1** = < 2%
**2** = 2-20%
**3** = 21-60%
**4** = > 60%

**QE Code:**
**0 =** as defined
**1** = Species suspe
**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

| **ORGANIZATION: JFNew** | | | | | **DATE: 7/18/06** |
|---|---|---|---|---|---|
| **SITE INFORMATION** | | | | | **SITE COORDINATES** |
| **Plant Bed ID: 07** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 39.6 | | | | | Latitude: 601957 Northing |
| Substrate: | Waterbody ID: | | | | Longitude: 4571730 Easting |
| Marl? | Total # of Species: 18 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:4 | N:1 | F:1 | E:3 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| ASCINC | 1 | | | |
| CEPOCC | 1 | | | |
| CHARA | 4 | | | |
| COROBL | 1 | | | |
| DECVER | 1 | | | |
| ELOCAN | 1 | | | |
| HIBPAL | 1 | | | |
| LYTSAL | 1 | | | |
| MYRHET | 1 | | | |
| MYRSPI | 2 | | | |
| NAJMAR | 3 | | | |
| NYMTUB | 1 | | | |
| PHAARU | 1 | | | |
| POTGRA | 1 | | | |
| POTPEC | 2 | | | |
| SCIACU | 2 | | | |
| TYPANG | 1 | | | |
| VALAME | 2 | | | |
| | | | | |
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| | | | | |

**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
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**S =** Submersed

**Canopy:**
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**1** = Taken, not varified
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**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

**ORGANIZATION: JFNew** | **DATE: 7/18/06**

| SITE INFORMATION | | | | | SITE COORDINATES |
|---|---|---|---|---|---|
| **Plant Bed ID: 08** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: 23.9 | | | | | Latitude: 602219 Northing |
| Substrate: | Waterbody ID: | | | | Longitude: 4571330 Easting |
| Marl? | Total # of Species: 17 | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:3 | N:1 | F:1 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| CERDEM | 1 | | | |
| CHARA | 3 | | | |
| CX sp. | 1 | | | |
| ELOCAN | 1 | | | |
| LEMMIN | 1 | | | |
| LIPLAN | 1 | | | |
| MYRSPI | 1 | | | |
| NAJGRA | 1 | | | |
| NAJMAR | 1 | | | |
| NYMTUB | 1 | | | |
| POTAMP | 1 | | | |
| POTGRA | 2 | | | |
| POTNOD | 1 | | | |
| POTPEC | 2 | | | |
| SCIPUN | 1 | | | |
| SPIPOL | 1 | | | |
| VALAME | 2 | | | |
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**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
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**Canopy:**
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**Voucher:**
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**1** = Taken, not varified
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**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# Aquatic Vegetation Plant Bed Data Sheet



**State of Indiana Department of Natural Resources**

**ORGANIZATION: JFNew** | **DATE: 7/18/06**

| SITE INFORMATION | | | | | SITE COORDINATES |
|---|---|---|---|---|---|
| **Plant Bed ID: Channel** | Waterbody Name: Big Chapman | | | | Center of the Bed |
| Bed Size: | | | | | Latitude: NA |
| Substrate: | Waterbody ID: | | | | Longitude: NA |
| Marl? | Total # of Species | | | | Max. Lakeward Extent of Bed |
| High Organic? | **CanopyAbundance at Site** | | | | Latitude: NA |
| | S:3 | N:1 | F:3 | E:1 | Longitude: NA |

**SPECIES INFORMATION**

| Species Code | Abundance | QE | Vchr. | Ref. ID |
|---|---|---|---|---|
| CERDEM | 3 | | | |
| CHARA | 2 | | | |
| DRYTHP | 1 | | | |
| LEMMIN | 1 | | | |
| MYRHET | 1 | | | |
| MYRSPI | 2 | | | |
| NAJFLE | 1 | | | |
| NAJGUA | 1 | | | |
| NAJMAR | 2 | | | |
| NUPADV | 2 | | | |
| NYMTUB | 2 | | | |
| POTCRI | 1 | | | |
| POTPEC | 1 | | | |
| SCIACU | 1 | | | |
| SPIPOL | 1 | | | |
| TYPANG | 1 | | | |
| UTRVUL | 1 | | | |
| VALAME | 3 | | | |
| | | | | |
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| | | | | |

**Individual Plant Bed Survey**

**Comments:**

**REMINDER INFORMATION**

**Substrate:**
**1** = Silt/Clay
**2** = Silt w/Sand
**3** = Sand w/Silt
**4** = Hard Clay
**5** = Gravel/Rock
**6** = Sand

**Marl**
**1 =** Present
**0** = absent

**High Organic**
**1** = Present
**0** = absent

**Overall Surface Cover**
**N** = Nonrooted floating
**F** = Floating, rooted
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**S =** Submersed

**Canopy:**
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**Abundance:**
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**QE Code:**
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**2** = Genus suspected
**3** = Unknown

**Voucher:**
**0** = Not Taken
**1** = Taken, not varified
**2** = Taken, varifie

**Reference ID:**
Unique number or letter to denote specific location of a species; referenced on attached map

# May Tier II Data

| LAKE | SITE | NORTHING | EASTING | DEPTH | ALL | ALGAE | CERDEM | CHARA | ELOCAN | ELONUT | MYREXA | NAJFLE | NAJGUA | NAJMAR | NAJMIN | NITELLA | POTAMP | POTGRA | POTILL | POTPEC | POTPUS | UTRGEM | UTRGIB | UTRVUL | VALAME | MYRSPI | POTCRI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| little | 1 | 601045.7 | 601045.7 | 10.0 | 1 | 1 | | | | | 1 | | | | | | | | | | | | | | | | |
| little | 2 | 601158.9 | 4569796.8 | 13.0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | |
| little | 3 | 601161.8 | 4569966.6 | 3.5 | 1 | 1 | | | | | 1 | | | | | | | | | | | | | | | | 1 |
| little | 4 | 601150.6 | 4569836.7 | 14.5 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | |
| little | 5 | 601007.9 | 4569796.2 | 2.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| little | 6 | 600947.4 | 4569726.6 | 3.0 | 3 | 1 | 1 | 1 | | | 1 | | | | | | | | | 1 | 1 | | | | | | |
| little | 7 | 600931.5 | 4569667.7 | 2.0 | 1 | 1 | 1 | 1 | | | 1 | | | | | | | | | | | | | | | | |
| little | 8 | 600925.9 | 4569623.3 | 15.0 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| little | 9 | 601045.7 | 4569573.2 | 7.0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | 1 | |
| little | 10 | 601034.5 | 4569526.2 | 2.5 | 1 | 1 | | | | | 1 | | | | | | | | | | | | | | | | |
| little | 11 | 601120.4 | 4569475.2 | 12.5 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | |
| little | 12 | 601136.0 | 4569426.8 | 5.0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | 1 | |
| little | 13 | 601097.3 | 4569381.5 | 1.5 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| little | 14 | 601068.2 | 4569325.0 | 14.0 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| little | 15 | 601266.4 | 4569304.5 | 9.5 | 1 | | 1 | | | | | | | | | | | | | | | | | | | | |
| little | 16 | 601245.0 | 601045.7 | 5.5 | 3 | 1 | 1 | | | | 1 | | | | | | | | | | | | | | | | |
| little | 17 | 601148.4 | 4569194.1 | 3.0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| little | 18 | 601093.2 | 4569169.0 | 2.5 | 1 | 1 | 1 | | | | 1 | | | | | | | | | 1 | | | | | | | |
| little | 19 | 601147.4 | 4569127.7 | 1.5 | 3 | 3 | 1 | | | | | | | | | | | | | | | | | | | | |
| little | 20 | 601094.6 | 4569256.1 | 5.5 | 3 | 1 | 3 | | | | 1 | | | | | | | | | 1 | | | | | | 1 | |
| little | 21 | 601227.5 | 4569171.8 | 14.0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | |
| little | 22 | 601311.4 | 4569211.8 | 3.0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| little | 23 | 601331.3 | 4569184.4 | 5.5 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | 1 |
| little | 24 | 601439.5 | 4569272.8 | 2.5 | 1 | 1 | | | | | 1 | | | | | | | | | | | | | | | | |
| little | 25 | 601398.8 | 4569217.2 | 1.5 | 1 | 1 | | | | | | | 1 | | | | | | | | | | | | | | 1 |
| little | 26 | 601462.0 | 4569271.8 | 1.5 | 1 | 1 | 1 | | | | 1 | | | | | | | 1 | | 1 | | | | | | | |
| little | 27 | 601541.9 | 4569332.8 | 14.0 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| little | 28 | 601532.7 | 4569386.0 | 1.5 | 1 | 1 | | | | | 1 | | | | | | | 1 | | | | | | | | | |
| little | 29 | 601591.3 | 4569403.1 | 5.5 | 1 | 1 | | | | | | | | | | | | | | 1 | | | | | | 1 | |
| little | 30 | 601589.0 | 4569461.2 | 1.5 | 1 | 1 | | 1 | | | | | | | | | | 1 | | | | | | | | | |
| little | 31 | 601618.0 | 4569483.6 | 5.5 | 1 | | | | | | | | | | | | | | | | | | | | 1 | | |
| little | 32 | 601622.2 | 4569549.4 | 1.5 | 1 | 1 | | | | | 1 | | | | | | | | | | | | | | | 1 | |
| little | 33 | 601593.5 | 4569651.8 | 3.0 | 1 | 1 | | | | | 1 | | | | | | | | | | | | | | | 1 | |
| little | 34 | 601584.3 | 4569749.9 | 7.0 | 1 | | | | | | | | | | | | | | | | | | | | | 1 | |
| little | 35 | 601514.5 | 4569862.2 | 2.0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| little | 37 | 601442.7 | 4569961.5 | 12.0 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| little | 38 | 601387.9 | 4570008.1 | 6.0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| little | 39 | 601363.6 | 4570095.9 | 2.0 | 1 | 1 | 1 | 1 | | | | | 1 | | | | | | | 1 | | | | | | 1 | |
| little | 40 | 601366.5 | 4570123.7 | 14.5 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| little | 41 | 601211.2 | 4570109.3 | 13.0 | 0 | 1 | | | | | | | | | | | | | | | | | | | | | |
| little | 42 | 601151.4 | 4570117.6 | 3.0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| little | 43 | 601133.3 | 4570093.2 | 10.0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | 1 |
| little | 44 | 601127.8 | 4570156.7 | 10.0 | 1 | | | | | | | | | | | | | | | | | | | | | | 1 |
| little | 45 | 601208.3 | 4570175.3 | 3.0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | 1 | |
| little | 46 | 601269.8 | 4570223.7 | 7.0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | 1 | 1 |
| little | 47 | 601204.7 | 4570222.0 | 5.5 | 1 | 1 | | | | | | | | | | | | | | | | | | | | 1 | |
| little | 48 | 601139.1 | 4570232.2 | 9.0 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | |
| little | 49 | 601071.7 | 4570195.7 | 5.5 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | 1 | 1 |
| little | 50 | 601024.0 | 4570177.5 | 9.5 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | 1 |
| little | 51 | 601000.0 | 4570223.5 | 3.0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |

| LAKE | SITE | NORTHING | EASTING | DEPTH | ALL | ALGAE | CERDEM | CHARA | ELOCAN | ELONUT | MYREXA | NAJFLE | NAJGUA | NAJMAR | NAJMIN | NITELLA | POTAMP | POTGRA | POTILL | POTPEC | POTPUS | UTRGEM | UTRGIB | UTRVUL | VALAME | MYRSPI | POTCRI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| big | 1 | 600889.5 | 4570560.4 | 8.5 | 1 | | | | | | | | | | | | | | | 1 | | | | | | | |
| big | 2 | 600843.8 | 4570704.8 | 4.0 | 1 | 1 | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 3 | 600769.5 | 4570833.9 | 2.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 4 | 600471.7 | 4570848.9 | 20.0 | 1 | 1 | | 1 | | | | | | | | 1 | | | | 1 | | | | | | | |
| big | 5 | 600426.0 | 4570761.0 | 14.0 | 5 | | 3 | | | | 1 | | | | | 1 | | | | | | | | | | 1 | 5 |
| big | 6 | 600344.0 | 4570784.3 | 1.5 | 1 | 1 | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 7 | 600388.7 | 4570826.6 | 14.0 | 5 | | 3 | | | | | | | | | | | | | | | | | | | 1 | 3 |
| big | 8 | 600388.8 | 4570953.7 | 2.0 | 5 | | | 5 | | | | | | 1 | | | | | | | | 1 | 1 | 1 | | | |
| big | 9 | 600410.8 | 4571037.0 | 3.0 | 1 | | | 1 | | | | | | | | | | | | 1 | | | | | | | |
| big | 10 | 600486.5 | 4571034.3 | 6.5 | 1 | | | 1 | | | | | | 1 | | | | | 1 | | | | | | | | |
| big | 11 | 600478.9 | 4570977.4 | 5.0 | 1 | | | 1 | | | | | | 1 | | | | | | | | | | | | | |
| big | 12 | 600662.7 | 4571224.0 | 14.0 | 1 | | 1 | | 1 | 1 | | | | | | | | | | | | | | | | | 1 |
| big | 13 | 600720.2 | 4571228.4 | 12.5 | 1 | | | | | | | | | | | | | | | | | | | | | | 1 |
| big | 14 | 600765.0 | 4571268.7 | 3.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 15 | 600834.3 | 4571244.7 | 20.0 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| big | 16 | 600950.6 | 4571201.7 | 5.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 17 | 601061.5 | 4571204.5 | 3.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 18 | 601193.1 | 4571189.1 | 3.5 | 3 | 1 | | 3 | | | | | | | | | | | | 1 | | | | | | | |
| big | 19 | 601309.2 | 4571175.6 | 4.0 | 1 | | | 1 | | | | | | | | | | | | | | | | 1 | | | |
| big | 20 | 601320.5 | 4571105.1 | 5.5 | 1 | | | 1 | | | | | | | | | | 1 | | | | | | | | | 1 |
| big | 21 | 601258.2 | 4571118.5 | 13.0 | 1 | | 1 | | | | | | | | | | | | | 1 | | | | | | | 1 |
| big | 22 | 601418.4 | 4571129.3 | 6.0 | 1 | | | 1 | | | 1 | | | 1 | | | | | | 1 | | | | | | | |
| big | 23 | 601427.4 | 4571198.4 | 4.0 | 1 | 1 | | 1 | | | | | | | | | | | | 1 | | | | | | | |
| big | 24 | 601510.5 | 4571214.3 | 12.5 | 3 | | 3 | | | | | | | | | | | | | | | | | | | 1 | 1 |
| big | 25 | 601511.1 | 4571152.1 | 14.0 | 3 | | 1 | | | | | | | | | | | | | | | | | | | 1 | 3 |
| big | 26 | 601606.7 | 4571005.0 | 19.0 | 1 | 1 | | | | | | | | | | 1 | | | | | | | | | | | 1 |
| big | 27 | 601670.6 | 4570957.6 | 15.0 | 5 | 1 | 1 | | | | | | | | | 5 | | | | | | | | | | | 1 |
| big | 28 | 601707.3 | 4570881.3 | 9.5 | 5 | | 1 | | | | | | | | | | | | | 1 | | | | | | 5 | |
| big | 29 | 601570.2 | 4570717.9 | 2.5 | 1 | | | 1 | | | | | | | | | | | | | | | | 1 | | 1 | |
| big | 30 | 601437.1 | 4570780.9 | 15.0 | 5 | | 1 | | | | | | | | | 5 | | | | | | | | | | | |
| big | 31 | 601285.7 | 4570737.1 | 3.5 | 1 | | | 1 | | | | | | 1 | | | | | | 1 | | | | | | | |
| big | 32 | 601118.2 | 4570636.1 | 20.0 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| big | 33 | 601811.5 | 4570945.1 | 11.5 | 1 | 1 | | 1 | | | | | | | | | | | | 1 | | | | | | | 0 |
| big | 34 | 601932.4 | 4570820.6 | 3.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 35 | 602046.5 | 4570916.8 | 4.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 36 | 601977.4 | 4570940.7 | 2.5 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 37 | 602058.0 | 4571029.8 | 4.0 | 1 | | 1 | 2 | | | | | | | | | | | | | | | | | | | |
| big | 38 | 601964.0 | 4571026.7 | 15.0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| big | 39 | 601885.6 | 4571002.3 | 5.0 | 1 | | | 1 | | | | | | | | | | | | | | | | 1 | | | |
| big | 40 | 602237.2 | 4571004.8 | 12.0 | 5 | | 1 | | | | | | | | | | | | | | | | | | | 3 | 5 |
| big | 41 | 602193.8 | 4571035.0 | 3.5 | 1 | 1 | | 1 | | | | | | | | | | | | | | | | | | | 1 |
| big | 42 | 602181.5 | 4571132.9 | 7.0 | 1 | | | 1 | | | | | | 1 | | | | | 0 | 1 | | | | | | | |
| big | 43 | 602219.5 | 4571200.3 | 10.0 | 1 | | 1 | | | | | | | | | | | | | | | | | | | 3 | |
| big | 44 | 602288.4 | 4571313.0 | 19.0 | 1 | 1 | | | | | | | | | | 1 | | | | | | | | | | | |
| big | 45 | 602201.8 | 4571314.1 | 6.0 | 1 | | | 1 | | | | | | | | | | | | 1 | | | | | | | |

| LAKE | SITE | NORTHING | EASTING | DEPTH | ALL | ALGAE | CERDEM | CHARA | ELOCAN | ELONUT | MYREXA | NAJFLE | NAJGUA | NAJMAR | NAJMIN | NITELLA | POTAMP | POTGRA | POTILL | POTPEC | POTPUS | UTRGEM | UTRGIB | UTRVUL | VALAME | MYRSPI | POTCRI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| big | 46 | 602115.0 | 4571321.2 | 12.0 | 5 | | 3 | | | | | | | | | | | | | | | | | | | 3 | |
| big | 47 | 602160.5 | 4571522.4 | 14.5 | 1 | | 1 | | | | | | | | | | | | | | | | | | | 3 | 1 |
| big | 48 | 602096.1 | 4571509.8 | 14.0 | 1 | | 1 | | | | | | | | | | | | | | | | | | | | 1 |
| big | 49 | 602075.9 | 4571589.2 | 8.0 | 3 | | | | | | | | | | | | | | | | | | | | | 3 | |
| big | 50 | 602018.4 | 4571667.2 | 17.5 | 3 | | 1 | 3 | 1 | | | | 1 | | | | | | | | | | | | | | 1 |
| big | 51 | 601934.4 | 4571577.5 | 5.0 | 1 | | | 1 | | | | | | 1 | | | | | | | | | | | | | |
| big | 52 | 601921.5 | 4571489.1 | 8.5 | 1 | | | | | | | | | 1 | | | | | | 1 | | | | | | | |
| big | 53 | 602017.1 | 4571450.5 | 10.0 | 5 | | 3 | | | | | | | | | | | | | | | | | | | 5 | |
| big | 54 | 601869.2 | 4571658.0 | 18.0 | 3 | | 3 | | 1 | | | | | | | | | | | | | | | | | | 1 |
| big | 55 | 601814.1 | 4571671.16 | 4.0 | 1 | | | 1 | | | | | | | | | | | | | | | | 1 | | | |
| big | 56 | 601885.7 | 4571688.1 | 19.0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| big | 57 | 601937.7 | 4571768.5 | 4.5 | 1 | | | 1 | | | | | | | | | | 1 | | 1 | | | | | | 1 | |
| big | 58 | 601811.1 | 4571807.8 | 8.0 | 5 | | 3 | | | | | | | | | | | | | | | | | | | 5 | |
| big | 59 | 601655.0 | 4571757.3 | 4.5 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 60 | 601521.4 | 4571731.6 | 15.0 | 1 | | 1 | 1 | | | | | | | | | | | | | | | | | | | 1 |
| big | 61 | 601270.5 | 4571623.8 | 15.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | 1 |
| big | 62 | 601277.1 | 4571447.1 | 20.0 | 1 | 1 | | | | | | | | | | 1 | | | | | | | | | | | |
| big | 63 | 601352.4 | 4571426.7 | 5.0 | 1 | 1 | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 64 | 601367.9 | 4571366.0 | 3.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 65 | 601345.8 | 4571326.3 | 3.5 | 1 | | | 1 | | | | | | | | | | | | 1 | | | | | | | |
| big | 66 | 601487.8 | 4571806.8 | 14.0 | 1 | 1 | 1 | | | | | | | | | 1 | | | | | | | | | | | 1 |
| big | 67 | 601700.3 | 4571916.8 | 15.0 | 3 | | 3 | | | | | | 1 | | | 1 | | | | | | | | | | | 1 |
| big | 68 | 601762.4 | 4571841.2 | 5.0 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 69 | 601790.4 | 4571883.4 | 18.0 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| big | 70 | 601895.2 | 4571889.2 | 15.0 | 1 | | 1 | | | | | | | | | | | | | | | | | | | | |
| big | 71 | 601840.6 | 4571930.2 | 4.0 | 5 | | 3 | | | | | | | | | | | | | | | | | | | 5 | |
| big | 72 | 601835.4 | 4572035.2 | 5.5 | 5 | | 3 | | | | | | | | | | | | | | | | | | | 5 | 1 |
| big | 73 | 601759.2 | 4572092.3 | 5.5 | 5 | | | | | | | | | | | | | | | | | | | | | 5 | 1 |
| big | 74 | 601850.9 | 4572133.9 | 5.5 | 3 | | | 3 | | | | | | | | | | | | | | | | | | | |
| big | 75 | 601873.0 | 4572197.6 | 5.5 | 1 | | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 76 | 601829.6 | 4572237.6 | 7.5 | 3 | | | 3 | | | | | | | | | | | | | | | | | | | |
| big | 77 | 601354.8 | 4571589.2 | 6.0 | 1 | 1 | | | | | | | | | 1 | | 1 | | | | 1 | | | | | | |
| big | 78 | 601895.0 | 4571672.2 | 6.0 | 1 | 1 | | | | | | | | | | | | | 1 | | | | | | | | |
| big | 79 | 601897.2 | 4571321.2 | 6.0 | 1 | 1 | | | | | | | | | | | | 1 | | | | | | | | | |
| big | 80 | 601447.1 | 4571509.8 | 6.5 | 1 | 1 | | | | | | | | | | | | | | 1 | | | | | | | |
| big | 81 | 601751.2 | 4571667.2 | 7.0 | 1 | 1 | | | | | | | | | | | | | | | | 1 | | | | | |
| big | 82 | 601934.4 | 4571152.1 | 7.0 | 1 | 1 | | | 1 | | | | | | | | | | | | | | | | 1 | | |
| big | 83 | 601885.7 | 4571005.0 | 7.0 | 1 | | | 1 | 1 | | | | | | | | | | | | | | | | | | |
| big | 84 | 601937.7 | 4571198.4 | 8.0 | 1 | 1 | 1 | 1 | | | | 1 | | | | | | | | | | | | | | | |
| big | 85 | 602017.1 | 4571522.4 | 8.0 | 1 | 1 | | 1 | | | | | | | | | | | | | | | | | | | |
| big | 86 | 601814.1 | 4571577.5 | 8.5 | 1 | 1 | | 1 | 1 | | | | | | | | | | | | | | | | | | |
| big | 87 | 601921.5 | 4570957.6 | 11.0 | 1 | 1 | | | | | | | 1 | | | | | | | | | | | | | | |
| big | 88 | 601869.2 | 4571509.8 | 11.0 | 0 | | | | | | | | | | | | | | | | | | | | | | |
| big | 89 | 601655.0 | 4571214.3 | 11.0 | 1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | |
| big | 90 | 601811.1 | 4571489.1 | 11.5 | 0 | | | | | | | | | | | | | | | | | | | | | | |

# August Tier II Data

| ID | LAKE | SITE | DEPTH | X_coor | Y_coor | FILALG | CERDEM | CHARA | ELOCAN | HETDUB | MYREXA | NAJFLE | NAJGUA | NAJMAR | NITELLA | POTAMP | POTBER | POTGRA | POTILL | POTNOD | POTPEC | POTFRE | UTRVUL | VALAME | MYRSPI | POTCRI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 15 | Little | 1 | 2.0 | 600981 | 4570870 | 1.0 | 1.0 | 1.0 | | | | | | | | | | | | | 1.0 | | | | 1.0 | |
| 32 | Little | 2 | 2.0 | 600885 | 4570470 | | | | | | | | | | | | | | | | | | | | | |
| 39 | Little | 3 | 2.0 | 600963 | 4570330 | 1.0 | | 1.0 | | | | | | | | | | | | | | | | | | |
| 47 | Little | 4 | 2.0 | 600993 | 4570210 | 1.0 | 1.0 | 1.0 | | | 1.0 | 1.0 | | | | | | 1.0 | | | 3.0 | | | | | |
| 33 | Little | 5 | 2.5 | 600933 | 4570160 | 1.0 | | | | | 1.0 | | | | | | | | | | 1.0 | | | | | |
| 36 | Little | 6 | 2.5 | 601016 | 4570190 | | | | | | | | | | | | | | | | 1.0 | | | 1.0 | | |
| 20 | Little | 7 | 3.0 | 601055 | 4570190 | 3.0 | 1.0 | | | 1.0 | 1.0 | | 1.0 | | | 1.0 | | | | | | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |
| 21 | Little | 8 | 3.0 | 601132 | 4570150 | 1.0 | 1.0 | | | | 1.0 | | | | | | | | | | 1.0 | | | | 1.0 | 1.0 |
| 24 | Little | 9 | 3.0 | 601141 | 4570110 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | 1.0 | |
| 25 | Little | 10 | 3.0 | 601143 | 4570090 | 1.0 | 1.0 | 1.0 | | | | | | | | | | | | | 1.0 | | | 1.0 | | |
| 29 | Little | 11 | 3.0 | 601135 | 4569970 | 1.0 | | | | | | | | | | | | 1.0 | | | | | | 1.0 | | |
| 40 | Little | 12 | 3.0 | 601142 | 4569860 | 1.0 | | | | | 1.0 | | | | | | | | | | | | | 1.0 | | |
| 31 | Little | 13 | 3.5 | 601140 | 4569780 | 1.0 | | 1.0 | | | | | | | | | | | | | 1.0 | | | | | |
| 30 | Little | 14 | 4.0 | 601055 | 4569770 | 1.0 | | | | | | | | | | | | | | | | | | 1.0 | | |
| 34 | Little | 15 | 4.0 | 600936 | 4569720 | 1.0 | | | | | | | | | | | | | | | 1.0 | | | 1.0 | | |
| 37 | Little | 16 | 4.0 | 600954 | 4569640 | 1.0 | | 1.0 | | | | | | | | | | | | | | | | 1.0 | | |
| 40 | Little | 17 | 5.0 | 600982 | 4569570 | | | | | | | | | | | | | | | | | | | | | |
| 46 | Little | 18 | 5.0 | 601031 | 4569530 | 1.0 | 5.0 | | | | | | | | | | | | | | | | | | | |
| 47 | Little | 19 | 5.0 | 601031 | 4569590 | 1.0 | 5.0 | | | | 1.0 | | | | | | | | | | | | | | 1.0 | |
| 26 | Little | 20 | 5.0 | 601115 | 4569490 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 7 | Little | 21 | 5.0 | 601126 | 4570240 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 14 | Little | 22 | 5.0 | 601213 | 4570260 | 1.0 | 1.0 | | | | 3.0 | | | | | | | | | | | | | | 3.0 | |
| 49 | Little | 23 | 5.0 | 601182 | 4570160 | 1.0 | 1.0 | | | | 1.0 | | | | | | | 1.0 | | | | | | | 5.0 | |
| 8 | Little | 24 | 5.5 | 601275 | 4570220 | 1.0 | 5.0 | | | | 1.0 | | | | | | | | | | | | | | | |
| 9 | Little | 25 | 5.5 | 601364 | 4570130 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 2 | Little | 26 | 6.0 | 601383 | 4570090 | 1.0 | 5.0 | | | | | | | | | | | | | | | | | | | |
| 43 | Little | 27 | 6.0 | 601216 | 4570110 | 1.0 | 5.0 | | | | | | | | | | | | | | | | | | | |
| 45 | Little | 28 | 6.0 | 601385 | 4570020 | 1.0 | 5.0 | | | | 1.0 | | | | | | | | | | | | | | 1.0 | |
| 48 | Little | 29 | 6.0 | 601427 | 4570000 | | | | | | | | | | | | | | | | | | | | | |
| 10 | Little | 30 | 7.0 | 601530 | 4569870 | 1.0 | | | | | | | | | | | | | | | | | | 1.0 | | |
| 16 | Little | 31 | 7.5 | 601571 | 4569790 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 18 | Little | 32 | 7.5 | 601583 | 4569710 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| | Little | 33 | 8.0 | 601626 | 4569590 | 1.0 | | 1.0 | | | | | | | | | | | | | | | | | | |
| | Little | 34 | 8.0 | 601601 | 4569470 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 3 | Little | 35 | 9.0 | 601564 | 4569480 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| | Little | 36 | 9.0 | 601582 | 4569400 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 1 | Little | 37 | 9.5 | 601550 | 4569380 | 1.0 | 1.0 | | | | | | 1.0 | | | | | | | | | | | | | |
| 42 | Little | 38 | 9.5 | 601502 | 4569320 | | | | | | | | | | | | | | | | | | | | | |
| 5 | Little | 39 | 10.0 | 601470 | 4569300 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 6 | Little | 40 | 10.0 | 601445 | 4569270 | 3.0 | | | | | | | | | | | | | | | | | | | | |
| 4 | Little | 41 | 10.5 | 601361 | 4569230 | 3.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 44 | Little | 42 | 11.0 | 601303 | 4569240 | 1.0 | 5.0 | | | | | | | | | | | | | | | | | | | |
| 35 | Little | 43 | 12.0 | 601322 | 4569200 | | | | | | | | | | | | | | | | | | | | | |
| 17 | Little | 44 | 13.0 | 601237 | 4569200 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 22 | Little | 45 | 13.0 | 601231 | 4569180 | | | | | | | | | | | | | | | | | | | | | |
| 27 | Little | 46 | 13.0 | 601152 | 4569200 | | | | | | | | | | | | | | | | | | | | | |
| 41 | Little | 47 | 13.0 | 601122 | 4569220 | | | | | | | | | | | | | | | | | | | | | |
| 26 | Little | 48 | 14.0 | 601232 | 4569290 | | | | | | | | | | | | | | | | | | | | | |
| 12 | Little | 49 | 14.0 | 601113 | 4569390 | 1.0 | 3.0 | 5.0 | | | | | | | | | | | | | 1.0 | | | | 1.0 | |
| 11 | Little | 50 | 15.0 | 601133 | 4569460 | | | | | | | | | | | | | | | | | | | | | |

| ID | LAKE | SITE | DEPTH | X_coor | Y_coor | FILALG | CERDEM | CHARA | ELOCAN | HETDUB | MYREXA | NAJFLE | NAJGUA | NAJMAR | NITELLA | POTAMP | POTBER | POTGRA | POTILL | POTNOD | POTPEC | POTFRE | UTRVUL | VALAME | MYRSPI | POTCRI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Big | 17 | 2 | 602139 | 4571120 | 1.0 | | 3.0 | | | | | | | | | | 1.0 | | | | | | | | |
| 2 | Big | 5 | 2 | 602157 | 4571060 | | | 1.0 | | | | | | | | | | | | | | | | | | |
| 3 | Big | 36 | 2 | 602232 | 4571010 | 1.0 | | 5.0 | | | | | | 1.0 | | | | | | | | | | | 5.0 | |
| 4 | Big | 36 | 2 | 602071 | 4571040 | 1.0 | 1.0 | 3.0 | | | | | | 1.0 | | | | 1.0 | | | | | | | 1.0 | |
| 5 | Big | 38 | 2 | 602059 | 4570900 | | | 1.0 | 1.0 | | | | | | | | | | | | | | | | | |
| 6 | Big | 41 | 2 | 601981 | 4570950 | | | 5.0 | | | | | | | | | | | | | | | | | | |
| 7 | Big | 16 | 3 | 601967 | 4571050 | 1.0 | | 5.0 | | | | | | | | | | | | | 1.0 | | | | | |
| 8 | Big | 31 | 3 | 601866 | 4571020 | | | 1.0 | | | | | | | | | | | | | | | | | | |
| 9 | Big | 84 | 3 | 601811 | 4570960 | 1.0 | 1.0 | 1.0 | 1.0 | | 1.0 | | | | | | | | | | 1.0 | | | 1.0 | | |
| 10 | Big | 9 | 3 | 601727 | 4570880 | 1.0 | | 3.0 | | | | | | | | | | | | | | | | | | |
| 11 | Big | 15 | 3 | 601654 | 4570960 | 1.0 | 1.0 | 5.0 | | | | | | 1.0 | | | | | | | 1.0 | | 1.0 | | | |
| 12 | Big | 27 | 3 | 601583 | 4571020 | 1.0 | 1.0 | 5.0 | | | | | | 1.0 | | 1.0 | | | | | | | 1.0 | | | |
| 13 | Big | 32 | 3 | 601741 | 4571040 | 1.0 | | 3.0 | | | | | | | | | | 1.0 | | | | | | | | |
| 14 | Big | 35 | 3 | 601586 | 4570760 | 1.0 | 1.0 | 5.0 | | | | | | | | | | | | | | | | | 1.0 | |
| 15 | Big | 40 | 3 | 601457 | 4570770 | 1.0 | | 5.0 | | | | | | 1.0 | | | | | | | 1.0 | | | | | |
| 16 | Big | 44 | 4 | 601397 | 4570760 | 1.0 | | 1.0 | | | | | 1.0 | 1.0 | | | | | | | | | | | | |
| 17 | Big | 46 | 4 | 601350 | 4570710 | 1.0 | | 1.0 | | | | | | | | | | | | | | | | | | |
| 18 | Big | 47 | 4 | 601520 | 4571180 | 1.0 | | 5.0 | | | | | | | | | | | | | | | | | | |
| 19 | Big | 48 | 5 | 601507 | 4571230 | 1.0 | | 5.0 | | | | | | | | | | | | | | | 1.0 | | | |
| 20 | Big | 55 | 5 | 601434 | 4571190 | | 1.0 | 3.0 | | | | | | | | | | | | | | | | 1.0 | | |
| 21 | Big | 61 | 5 | 601453 | 4571110 | 1.0 | 1.0 | 5.0 | | | | | | | | | | | | | 1.0 | | 1.0 | | | |
| 22 | Big | 63 | 5 | 601315 | 4571100 | 1.0 | | 5.0 | | | | | | | | | | | | | | | | | | |
| 23 | Big | 57 | 5 | 601241 | 4571110 | | | | | | | | | 1.0 | | | | | | | 1.0 | | | 1.0 | 0.0 | |
| 24 | Big | 83 | 5 | 601158 | 4571120 | 1.0 | 1.0 | 1.0 | | | | | | | | | | | | | | | | 1.0 | | |
| 25 | Big | 38 | 5 | 601091 | 4570610 | 1.0 | | 1.0 | | | | | | 1.0 | | | | | | | | | | | | |
| 26 | Big | 66 | 5 | 600904 | 4570590 | 1.0 | | 1.0 | | | | | | | | | | | | | | | | 1.0 | | |
| 27 | Big | 56 | 5 | 600890 | 4570550 | 1.0 | 1.0 | | | | | | | 1.0 | | | | | | | | | | 1.0 | | |
| 28 | Big | 77 | 5 | 600829 | 4570750 | 1.0 | | 1.0 | | | | | | | | | | 1.0 | | | | | | | | |
| 29 | Big | 82 | 5 | 600713 | 4570910 | 1.0 | | 5.0 | | | | | | | | | | | | | | | | 1.0 | | |
| 30 | Big | 67 | 6 | 600498 | 4570830 | | | | | | | | | 1.0 | | | | | | | 1.0 | | | | | |
| 31 | Big | 77 | 6 | 600431 | 4570760 | 1.0 | | 5.0 | | | | | | | | | | | | | 1.0 | | | | | |
| 32 | Big | 13 | 6 | 600403 | 4570750 | 1.0 | | 1.0 | | | | | | 1.0 | | | | | | | | | | | | |
| 33 | Big | 18 | 6 | 600353 | 4570780 | | | 3.0 | | | | | | 5.0 | | | | | | | 1.0 | | | | | |
| 34 | Big | 20 | 6 | 600405 | 4570960 | 1.0 | | 5.0 | | | | | | 1.0 | | | | | | | 1.0 | | | | | |
| 35 | Big | 51 | 6 | 600475 | 4571050 | 1.0 | 1.0 | 1.0 | 1.0 | | | | | | | 1.0 | | | | 1.0 | 1.0 | | | | | |
| 36 | Big | 3 | 7 | 600424 | 4571030 | | | 1.0 | | | | | | | | | | | | | | | | 1.0 | | |
| 37 | Big | 60 | 7 | 600633 | 4571200 | 1.0 | | | | | | | | | | | | | | | | | 1.0 | | | |
| 38 | Big | 58 | 7 | 600732 | 4571250 | 1.0 | | 3.0 | | | | | | 1.0 | | | | | 1.0 | 1.0 | | | | | | |
| 39 | Big | 78 | 7 | 600766 | 4571290 | 1.0 | | 3.0 | | | | | | | | | | | | | | | | | | |
| 40 | Big | 55 | 8 | 600856 | 4571280 | 1.0 | | 1.0 | | | | | | | | | | | | | 1.0 | | | 1.0 | | |
| 41 | Big | 56 | 8 | 600937 | 4571260 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 42 | Big | 6 | 9 | 601059 | 4571200 | 1.0 | | | | | 1.0 | | | 1.0 | | | | | | | 1.0 | | 1.0 | 1.0 | 3.0 | |
| 43 | Big | 49 | 8 | 601224 | 4571180 | 1.0 | | 1.0 | | | | | | | | | | | | | 1.0 | | | 1.0 | | |
| 44 | Big | 71 | 9 | 601319 | 4571180 | 1.0 | | | | | 1.0 | | | | | | | | | | 3.0 | | | | 1.0 | |

| ID | LAKE | SITE | DEPTH | X_coor | Y_coor | FILALG | CERDEM | CHARA | ELOCAN | HETDUB | MYREXA | NAJFLE | NAJGUA | NAJMAR | NITELLA | POTAMP | POTBER | POTGRA | POTILL | POTNOD | POTPEC | POTFRE | UTRVUL | VALAME | MYRSPI | POTCRI |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | Big | 52 | 9 | 601352 | 4571330 | 1.0 | | 1.0 | | | | | | | | | | | | | | | | 1.0 | | |
| 46 | Big | 69 | 9 | 601379 | 4571430 | 1.0 | 1.0 | | | | 1.0 | | | | | | | | | | | | | | | |
| 47 | Big | 10 | 9 | 601347 | 4571480 | 1.0 | | | | | 1.0 | | | 5.0 | | | | | | | 1.0 | | | | | |
| 48 | Big | 2 | 10 | 601276 | 4571440 | | 1.0 | | | | 1.0 | | | | | | | | | | | | | | 1.0 | |
| 49 | Big | 42 | 9 | 601270 | 4571600 | 1.0 | 3.0 | | | | 3.0 | | | | | | | | | | 1.0 | | | 1.0 | 5.0 | |
| 50 | Big | 4 | 9 | 601539 | 4571750 | 1.0 | 1.0 | 1.0 | | | 1.0 | | | | | | | | | | 1.0 | | | | | |
| 51 | Big | 19 | 8 | 601481 | 4571820 | 1.0 | | | | | | | | | | | | | | | 1.0 | | | | | |
| 52 | Big | 35 | 9 | 601664 | 4571820 | 1.0 | 1.0 | | | | | | | 1.0 | | | | | | | | | | | 1.0 | 1.0 |
| 53 | Big | 17 | 9 | 601667 | 4571940 | | 5.0 | | | | | | | | | | | | | | 1.0 | | | | | |
| 54 | Big | 26 | 9 | 601753 | 4572060 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 55 | Big | 75 | 10 | 601834 | 4572280 | | 1.0 | | | | | | | | | | | | | | | | | 1.0 | | |
| 56 | Big | 53 | 10 | 601867 | 4572180 | 1.0 | 5.0 | | | | | | | | | | | | | | 1.0 | | | | | |
| 57 | Big | 8 | 11 | 601856 | 4572110 | 1.0 | 5.0 | | | | | | | | | | | | | | | | | | | 1.0 |
| 58 | Big | 15 | 11 | 601860 | 4572010 | 1.0 | 5.0 | | | | | | | | 1.0 | | | | | | | | | | | |
| 59 | Big | 73 | 11 | 601878 | 4571920 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 60 | Big | 18 | 11 | 601890 | 4571860 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 61 | Big | 65 | 11 | 601806 | 4571920 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 62 | Big | 81 | 12 | 601781 | 4571850 | 1.0 | 5.0 | | 1.0 | | | | | | | | | | | | 1.0 | | | | | |
| 63 | Big | 64 | 13 | 601812 | 4571800 | 1.0 | 1.0 | | | | | | | | 1.0 | | | | | | | | | | | |
| 64 | Big | 68 | 13 | 601937 | 4571780 | 1.0 | 5.0 | | | | | | | | | | | | | | 1.0 | | | | | |
| 65 | Big | 39 | 13 | 601834 | 4571700 | 1.0 | 1.0 | | | | | | | | 1.0 | | | 1.0 | | | | | | | | 1.0 |
| 66 | Big | 55 | 13 | 601864 | 4571660 | 1.0 | 1.0 | | | | | | | | 1.0 | | | | | | | | | | | |
| 67 | Big | | 13 | 601800 | 4571650 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 68 | Big | | 13 | 601910 | 4571560 | 1.0 | | 1.0 | | | | | | | | | | | | | | | | | | |
| 69 | Big | | 14 | 601928 | 4571520 | 1.0 | | | | | | | | | 1.0 | | | | | | | | | | | |
| 90 | Big | | 14 | 601885 | 4571500 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 70 | Big | 50 | 15 | 602082 | 4571530 | | 1.0 | | 1.0 | | | | | | | | | | | | | | | | | |
| 89 | Big | | 15 | 602016 | 4571430 | | | | | | | | | | | | | | | | | | | | | |
| 71 | Big | 11 | 15 | 602028 | 4571680 | 1.0 | 1.0 | | | | | | | | 5.0 | | | | | | | | | | | |
| 72 | Big | 25 | 15 | 602107 | 4571600 | | | | | | | | | | | | | | | | | | | | | |
| 73 | Big | 51 | 15 | 602185 | 4571520 | 1.0 | 5.0 | 1.0 | 1.0 | | | | 1.0 | 1.0 | 1.0 | | | | | | | | | | | 1.0 |
| 84 | Big | | 15 | 602119 | 4571320 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 88 | Big | | 15 | 602200 | 4571360 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 74 | Big | 34 | 15 | 602279 | 4571370 | 1.0 | | | | | | | | | 1.0 | | | | | | | | | | | |
| 75 | Big | 70 | 15 | 602310 | 4571200 | | 1.0 | | | | | | | | | | | | | | | | | | | |
| 85 | Big | | 15 | 602105 | 4571430 | | | | | | | | | | | | | | | | | | | | | |
| 87 | Big | | 17 | 602320 | 4571521 | | | | | | | | | | | | | | | | | | | | | |
| 86 | Big | | 17 | 602122 | 4571231 | 1.0 | | | | | | | | | | | | | | | | | | | | |
| 76 | Big | 21 | 19 | 601875 | 4571425 | | | | | | | | | | | | | | | | | | | | | |
| 77 | Big | 22 | 19 | 601753 | 4571675 | | | | | | | | | | 1.0 | | | | | | | | | | | |
| 78 | Big | 76 | 19 | 601834 | 4571525 | | | | | | | | | | | | | | | | | | | | | |
| 79 | Big | 12 | 20 | 601867 | 4571325 | 1.0 | | | | | | | | | 3.0 | | | | | | | | | | | |
| 80 | Big | 74 | 20 | 601856 | 4571610 | 1.0 | 1.0 | | | | | | | | | | | | | | | | | | | |
| 81 | Big | | 20 | 601860 | 4571670 | | | | | | | | | | | | | | | | | | | | | |
| 82 | Big | 1 | 20 | 601878 | 4571520 | | 1.0 | | | | | | | | | | | | | | | | | 1.0 | | |
| 83 | Big | 7 | 20 | 601890 | 4571250 | | | | | | | | | | 1.0 | | | | | | | | | | | |

# APPENDIX B:

# SITE FREQUENCY GRAPHICS FOR LITTLE CHAPMAN LAKE

# CHAPMAN LAKES
# AQUATIC PLANT MANAGEMENT PLAN UPDATE

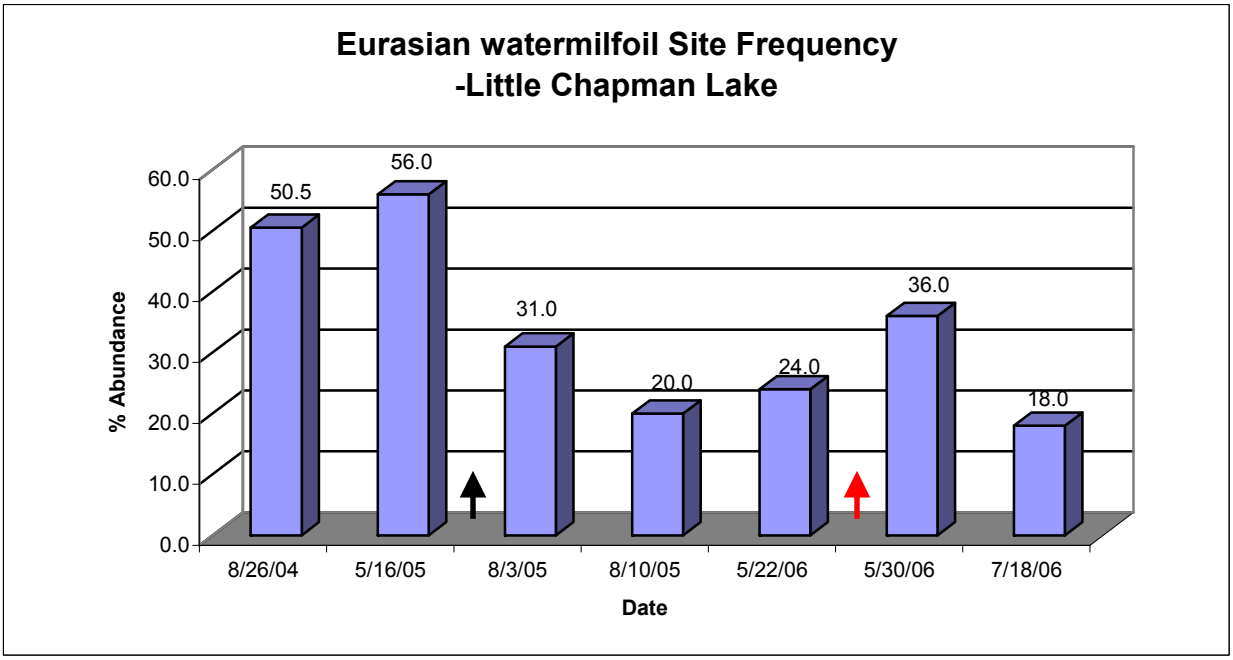



**Figure 1. Eurasian watermilfoil site abundance for the 2004, 2005 and 2006 sampling seasons in Little Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

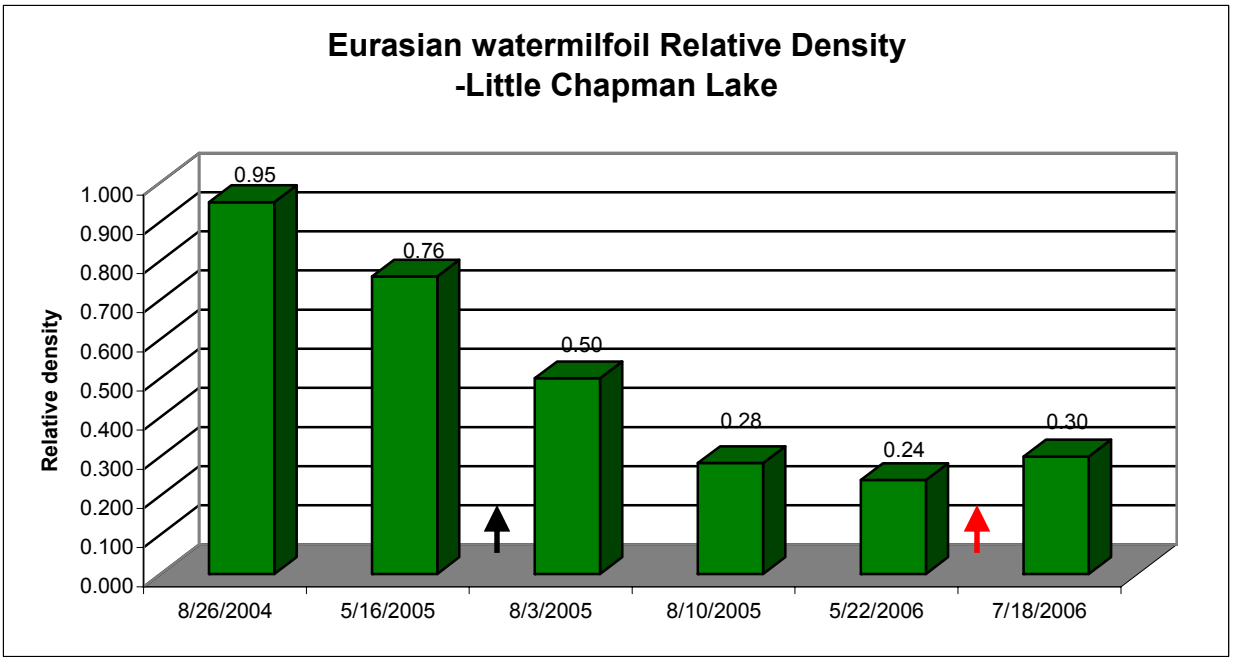



**Figure 2. Little Chapman Eurasian watermilfoil relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

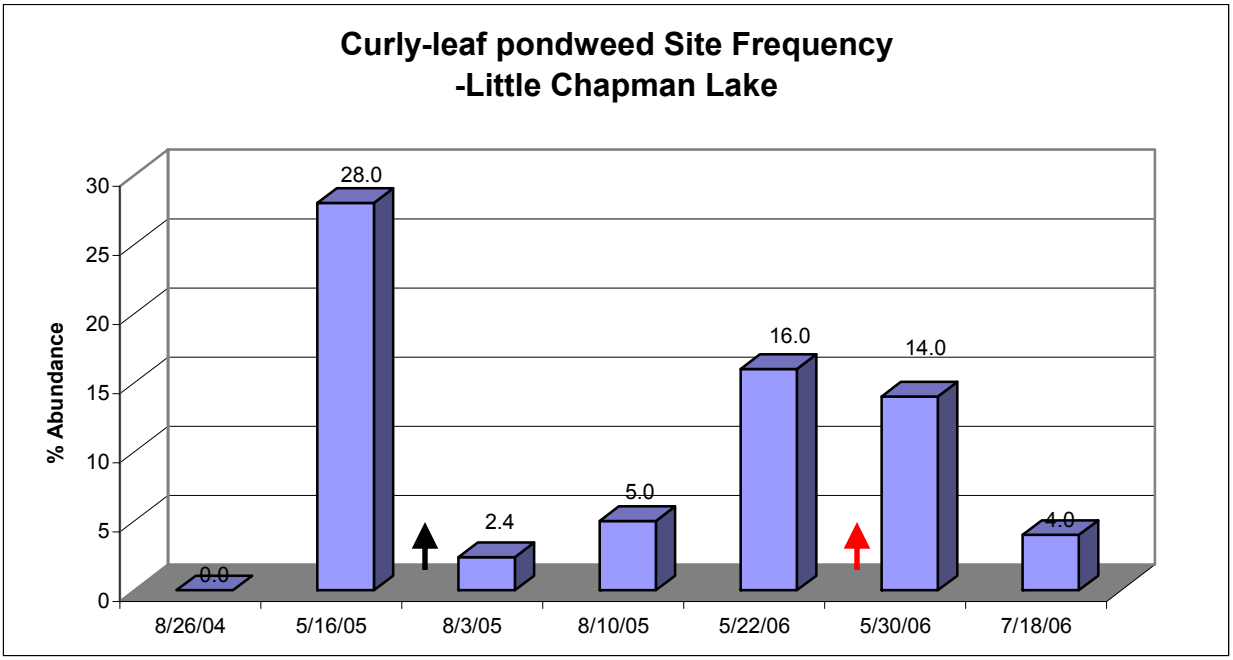



**Figure 3. Comparison of curly-leaf pondweed site frequency of occurrence at sites in the last three sampling seasons in Little Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

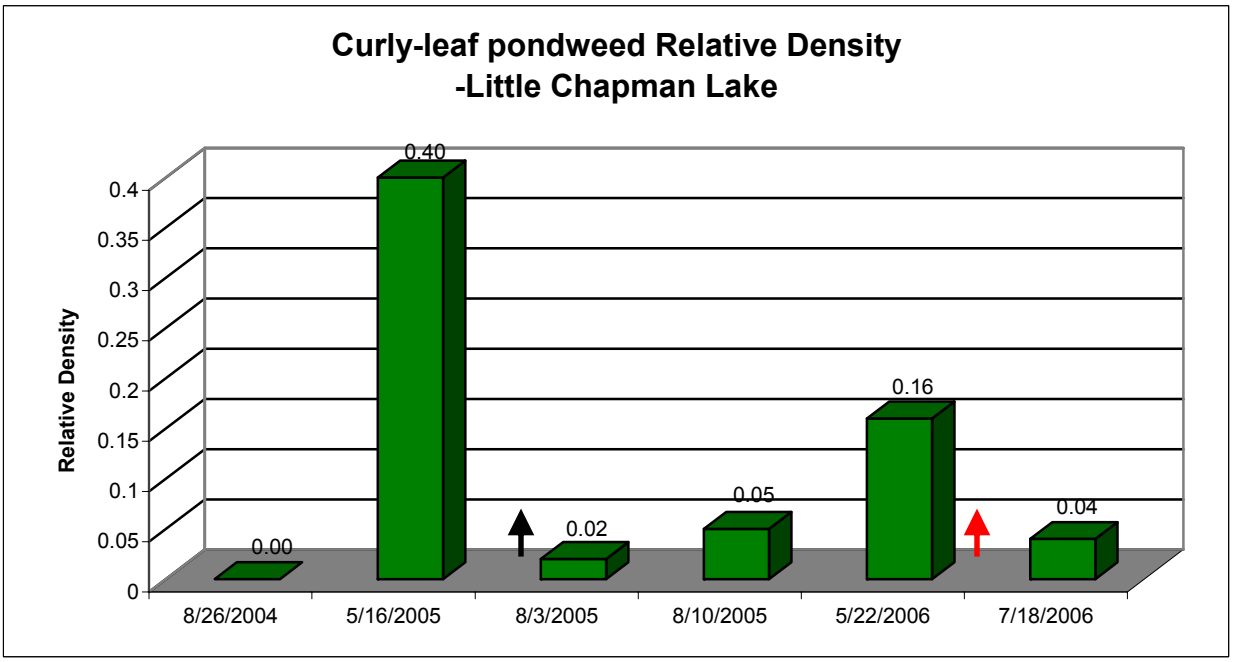



**Figure 4. Little Chapman curly-leaf pondweed relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

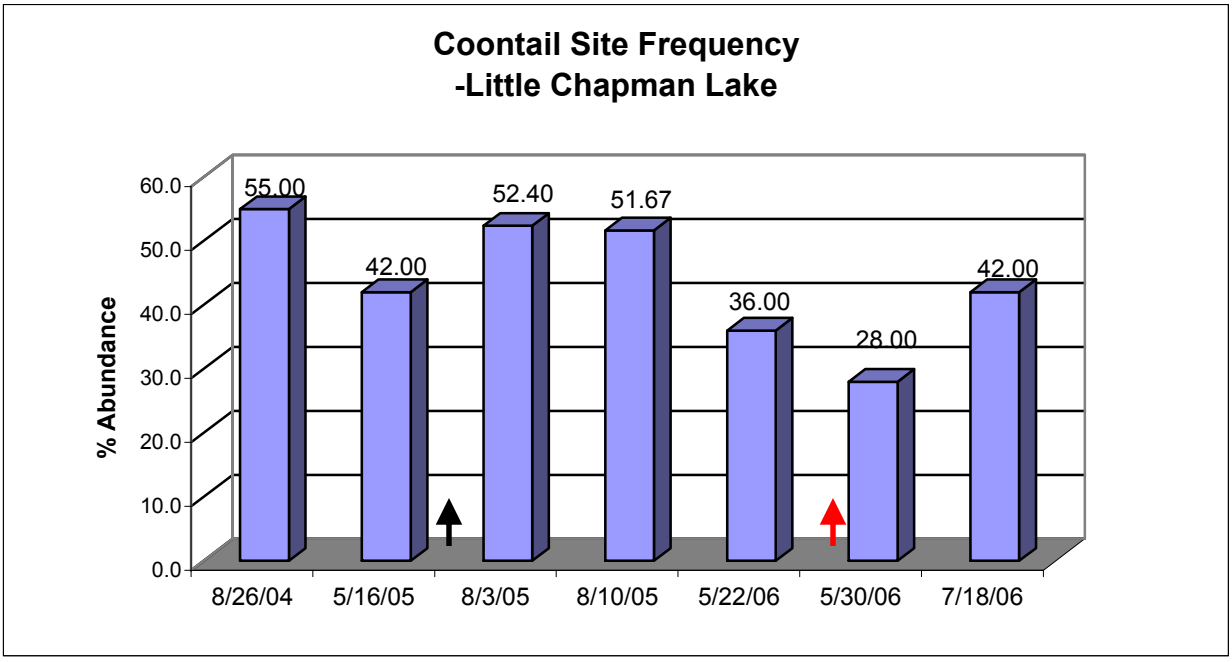



**Figure 5. Comparison of coontail site frequency of occurrence at sites in the last three sampling seasons in Little Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

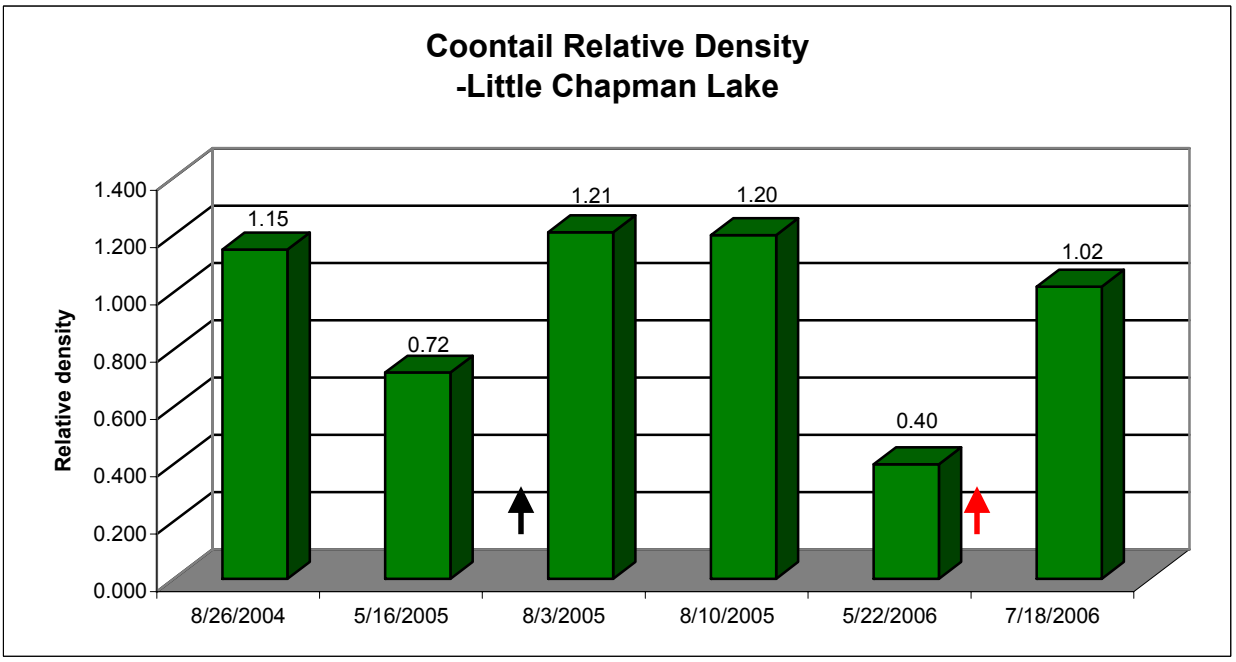



**Figure 6. Little Chapman coontail relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

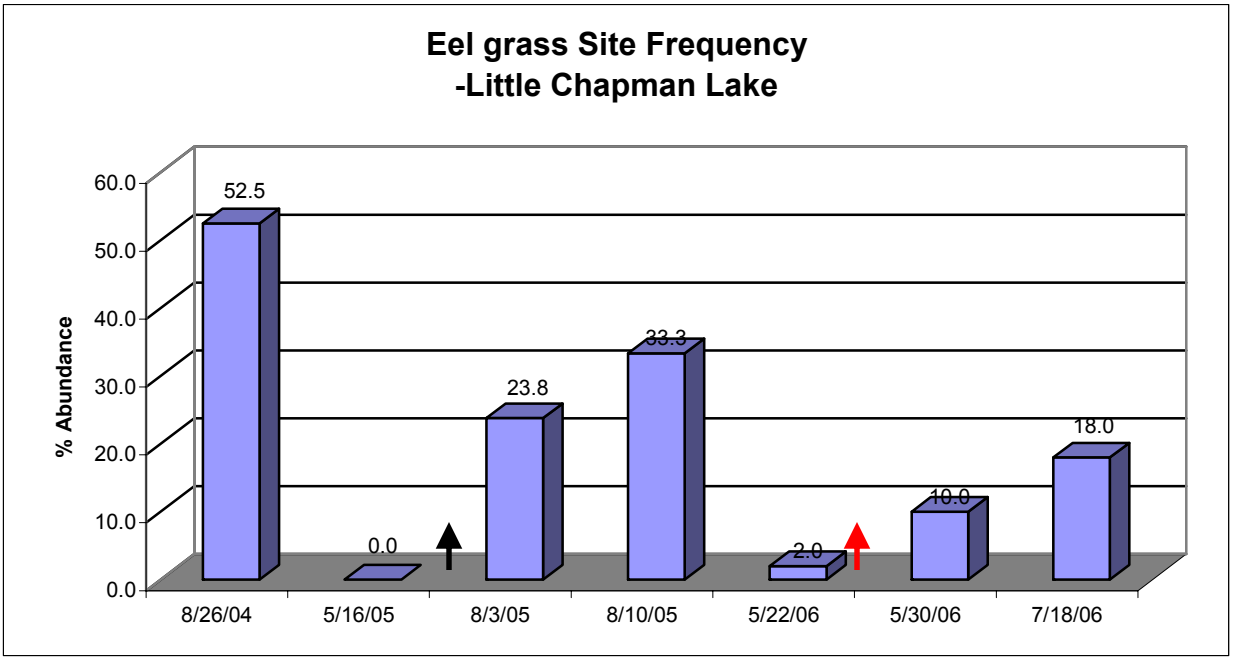



**Figure 7. Comparison of eel grass site frequency of occurrence at sites in the last three sampling seasons in Little Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

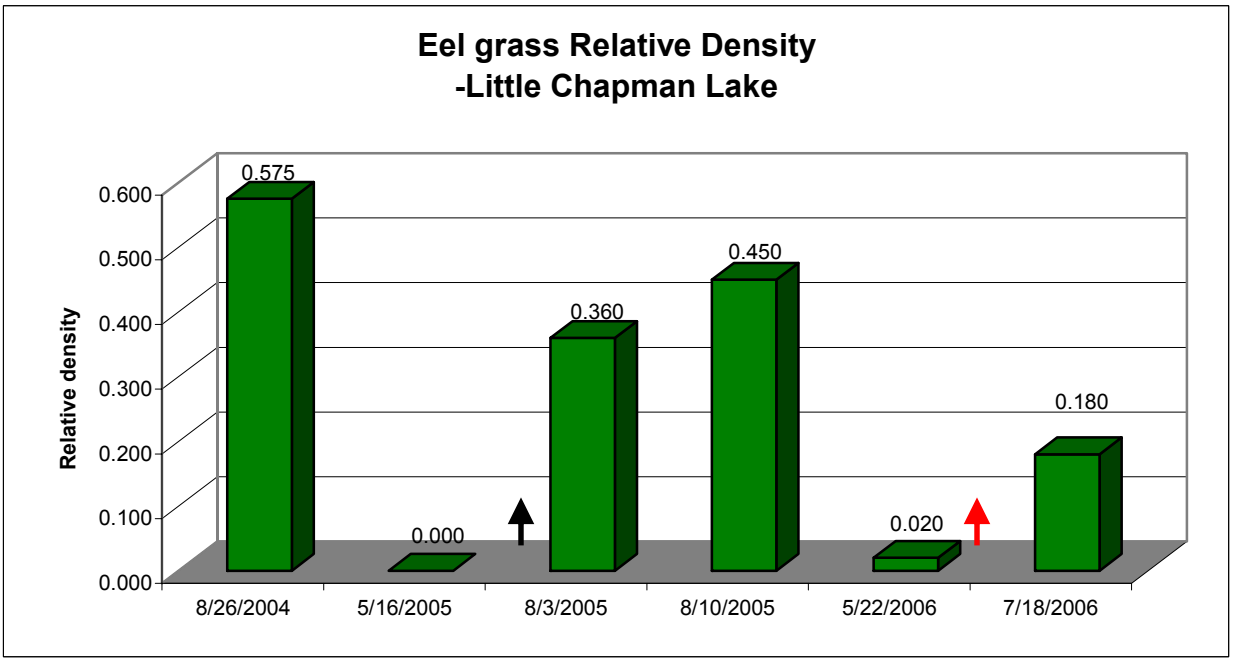



**Figure 8. Little Chapman eel grass relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

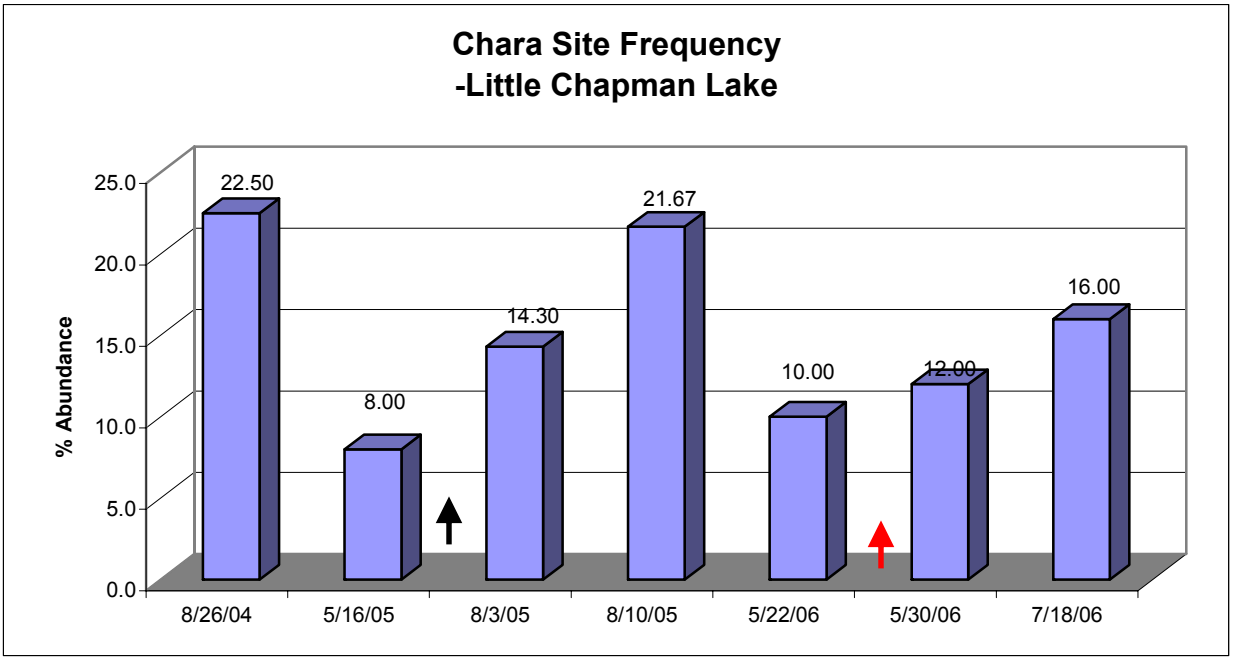



**Figure 9. Comparison of chara site frequency of occurrence at sites in the last three sampling seasons in Little Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

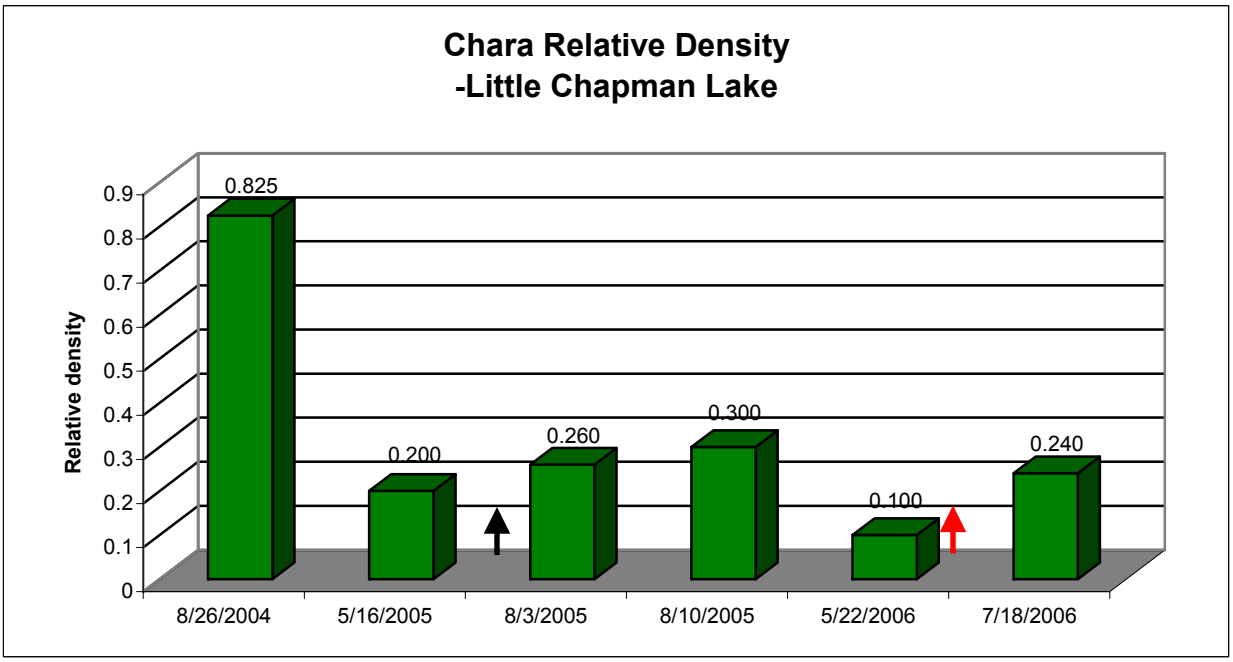



**Figure 10. Little Chapman chara relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

# APPENDIX C:

# SITE FREQUENCY GRAPHICS FOR BIG CHAPMAN LAKE

# CHAPMAN LAKES
# AQUATIC PLANT MANAGEMENT PLAN UPDATE

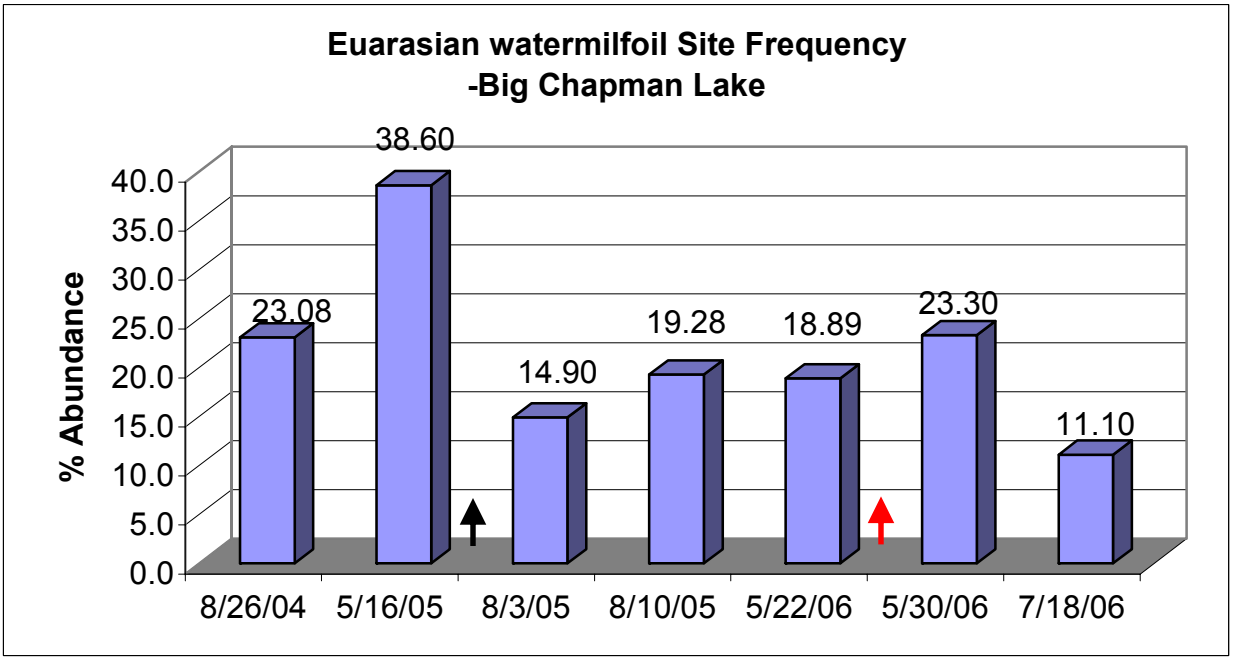



**Figure 1. Comparison of Eurasian watermilfoil site frequency of occurrence at sites in the last three sampling seasons in Big Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

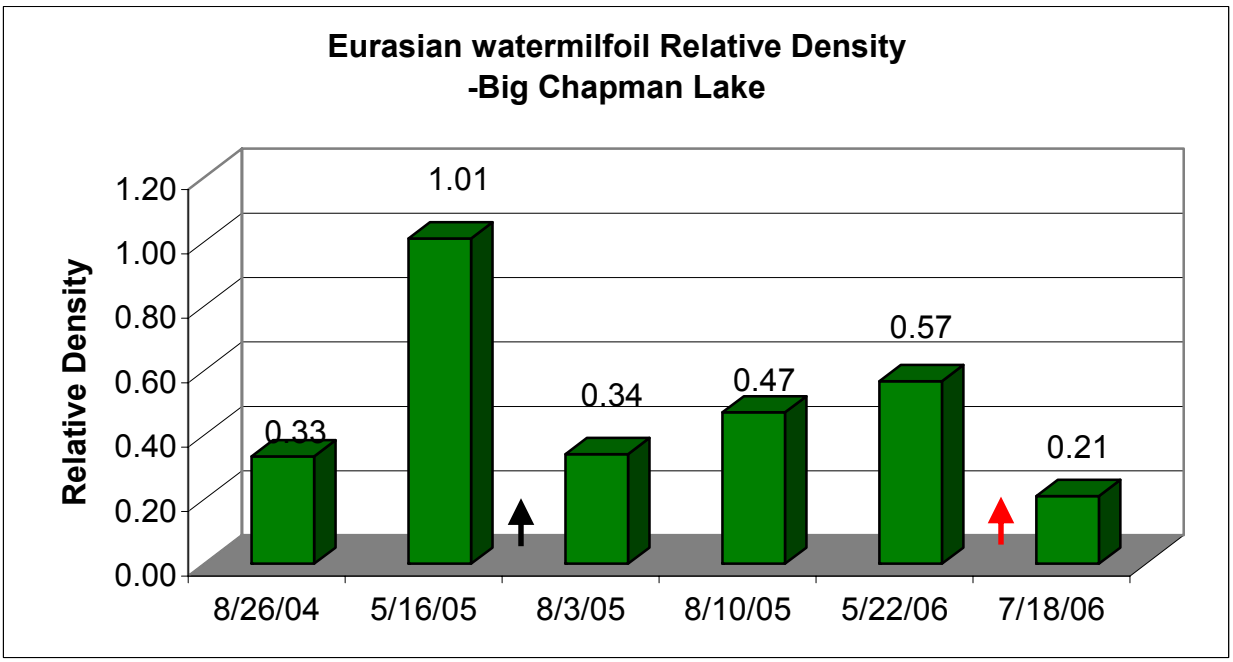



**Figure 2. Big Chapman Eurasian watermilfoil relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

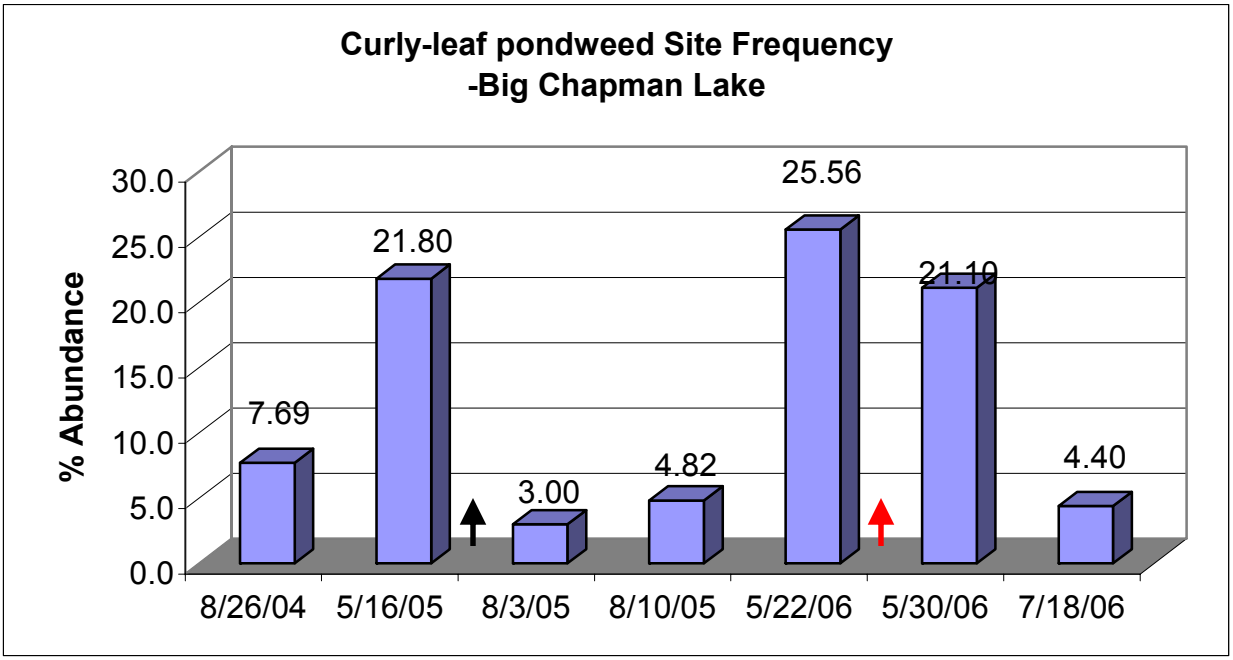



**Figure 3. Comparison of curly-leaf pondweed site frequency of occurrence at sites in the last three sampling seasons in Big Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

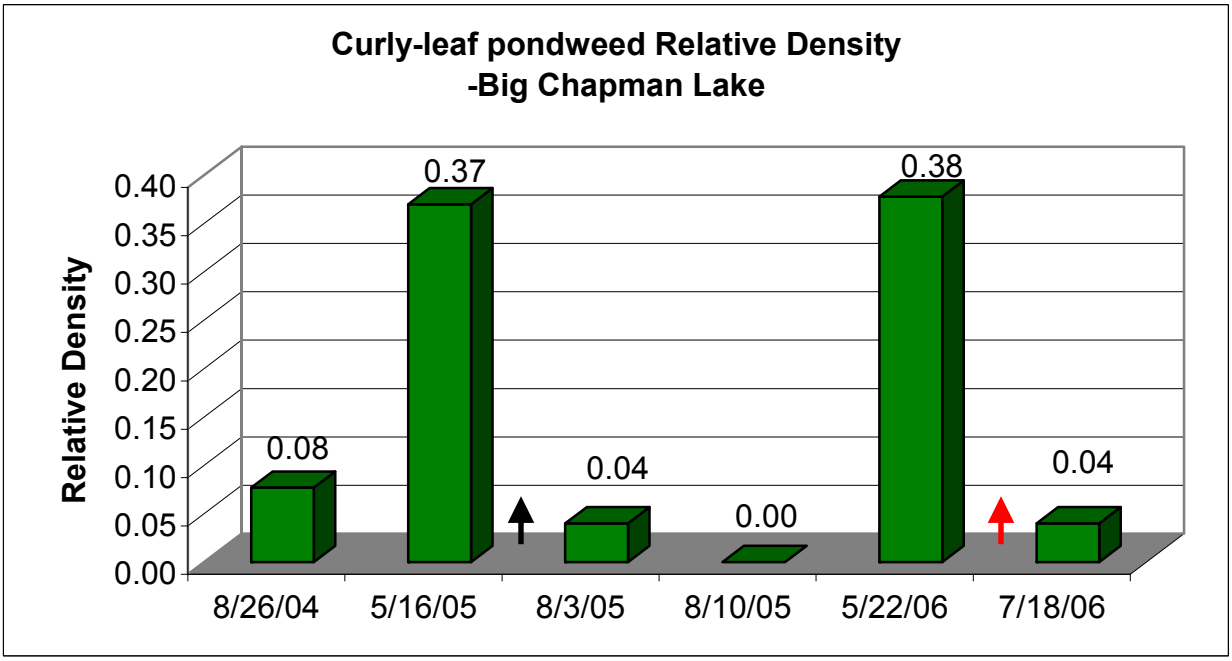



**Figure 4. Big Chapman curly-leaf pondweed relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

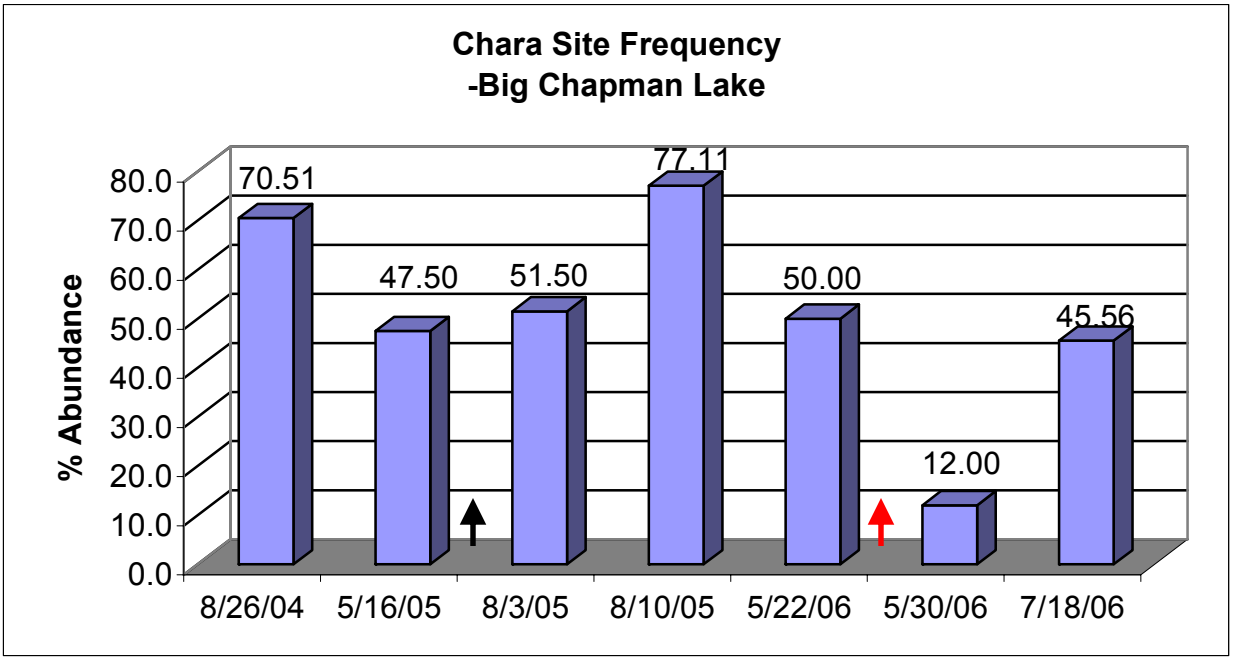



**Figure 5. Comparison of chara site frequency of occurrence at sites in the last three sampling seasons in Big Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

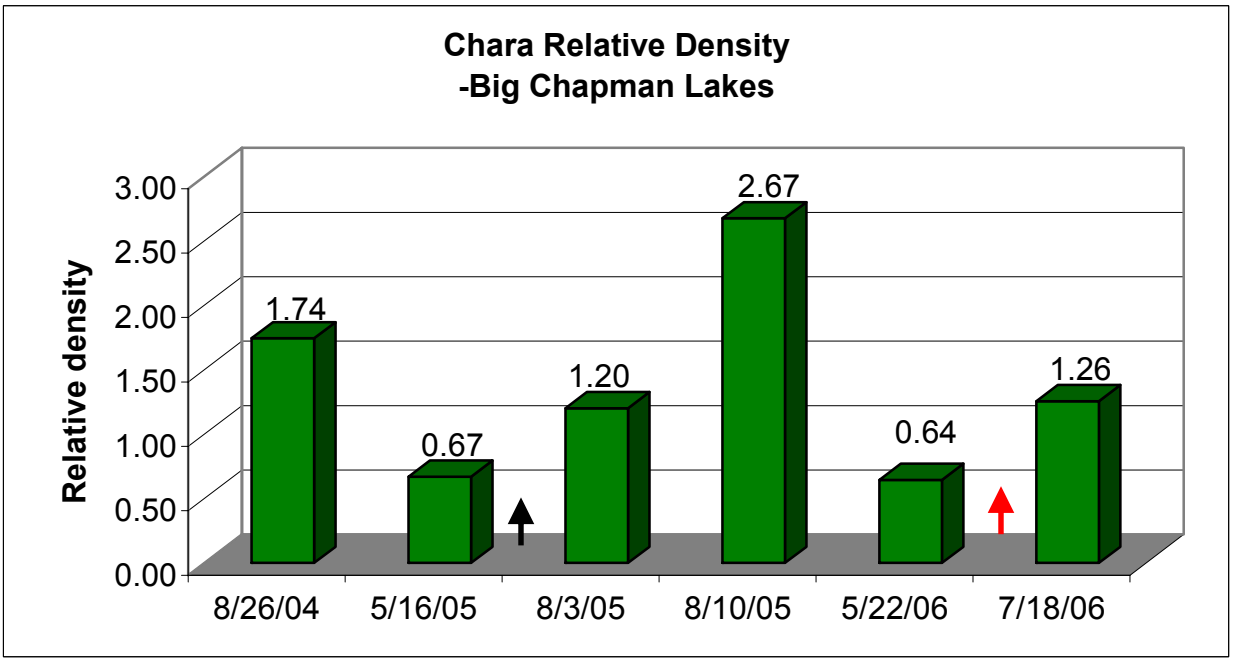



**Figure 6. Big Chapman chara relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

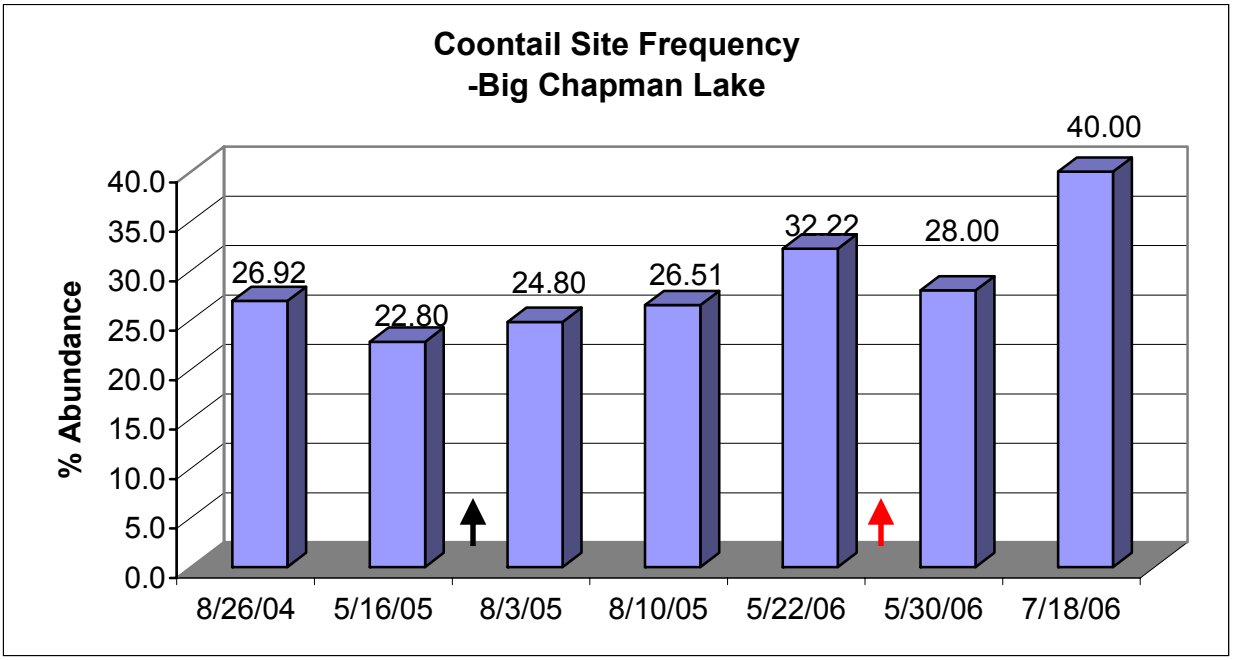



**Figure 7. Comparison of coontail site frequency of occurrence at sites in the last three sampling seasons in Big Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

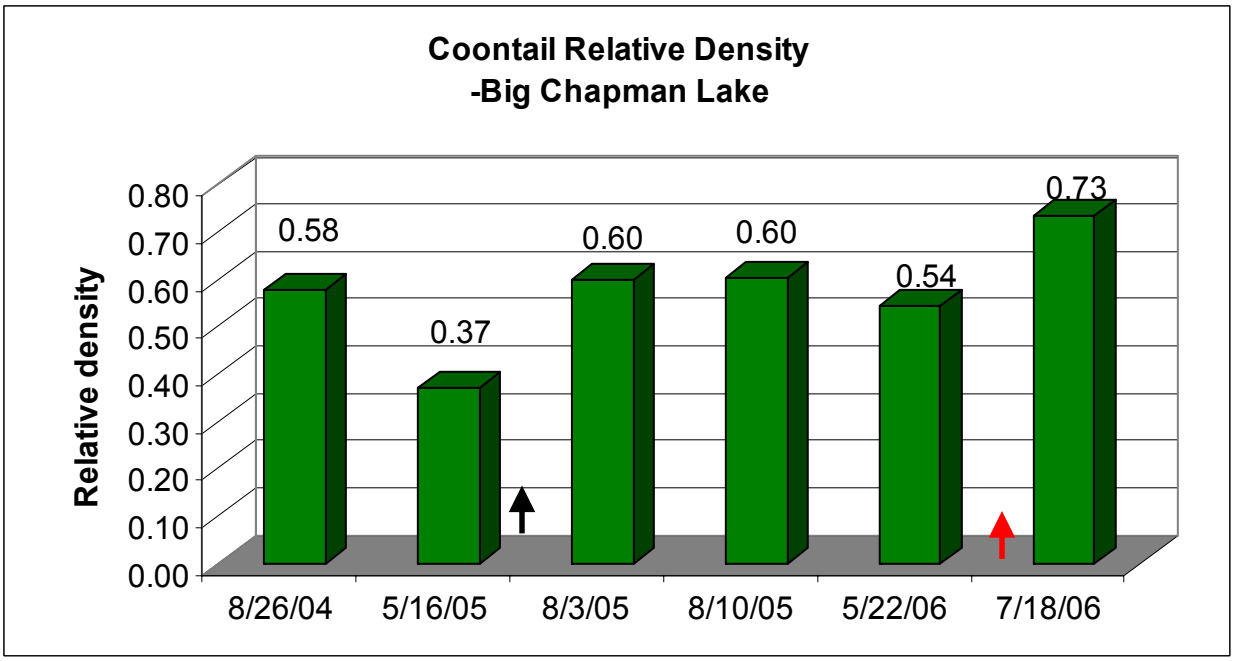



**Figure 8. Big Chapman coontail relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

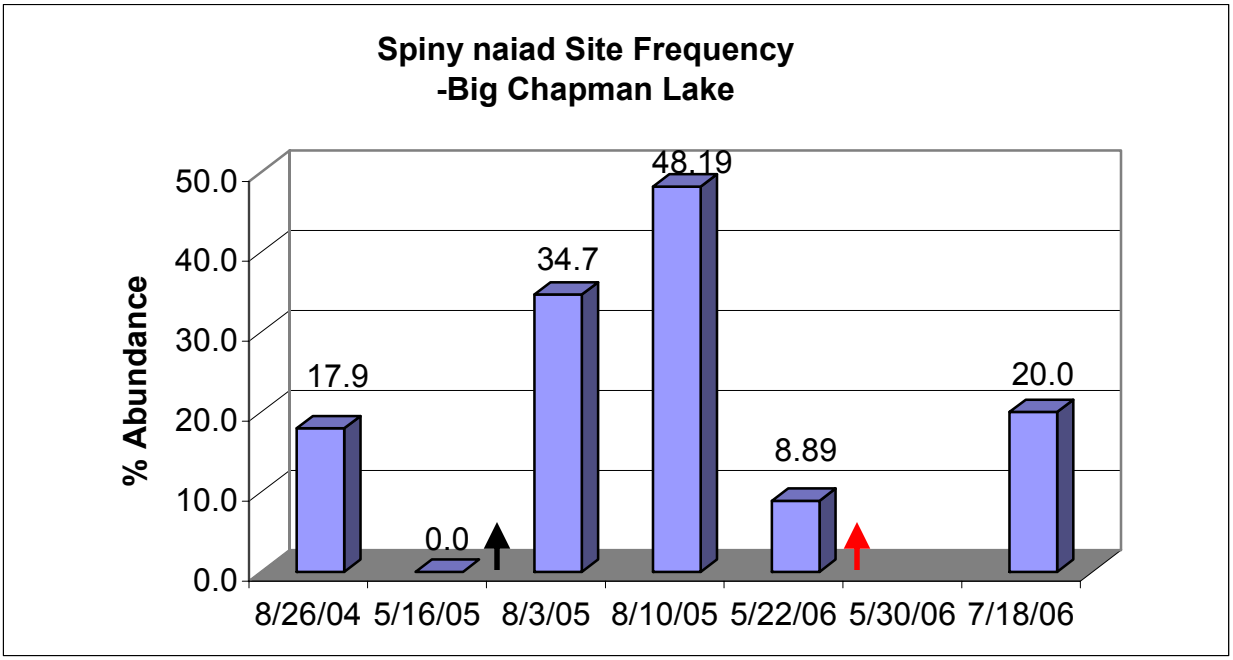



**Figure 9. Comparison of spiny naiad site frequency of occurrence at sites in the last three sampling seasons in Big Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

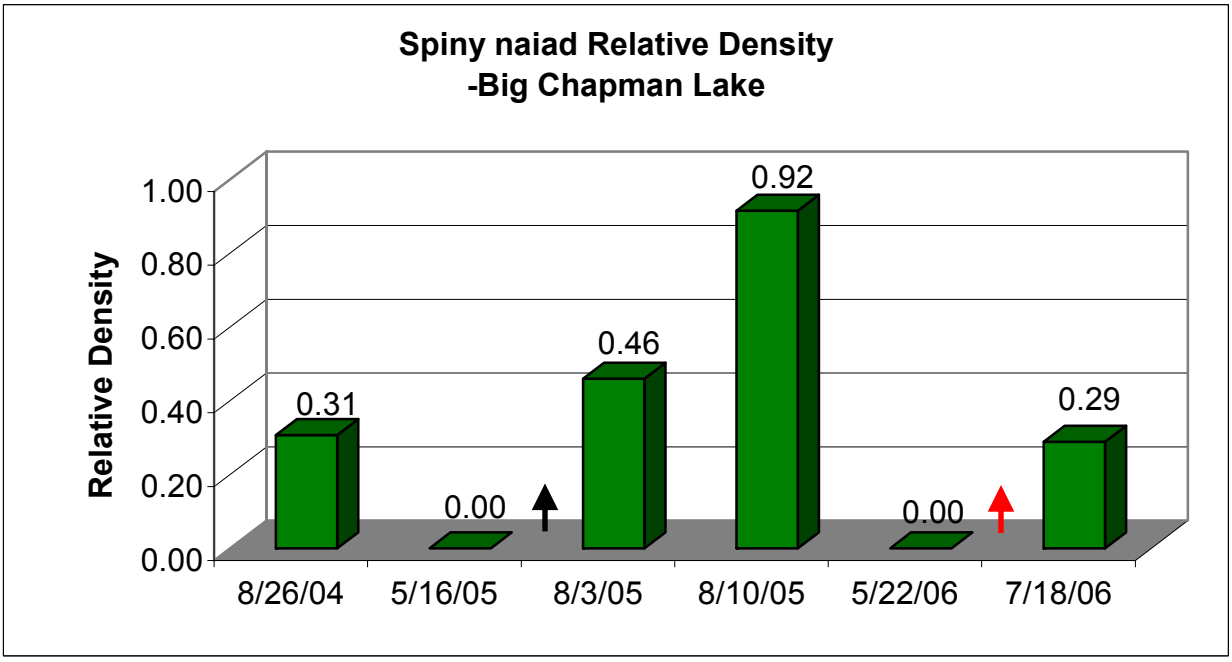



**Figure 10. Big Chapman spiny naiad relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

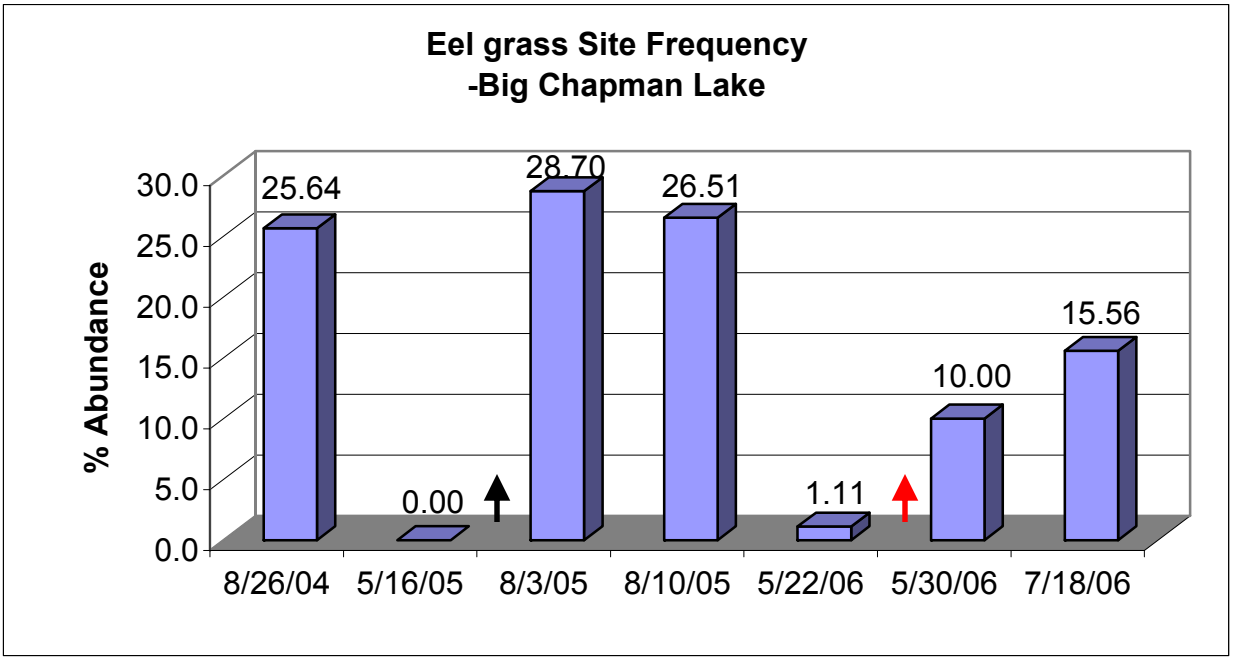



**Figure 11. Comparison of eel grass site frequency of occurrence at sites in the last three sampling seasons in Big Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

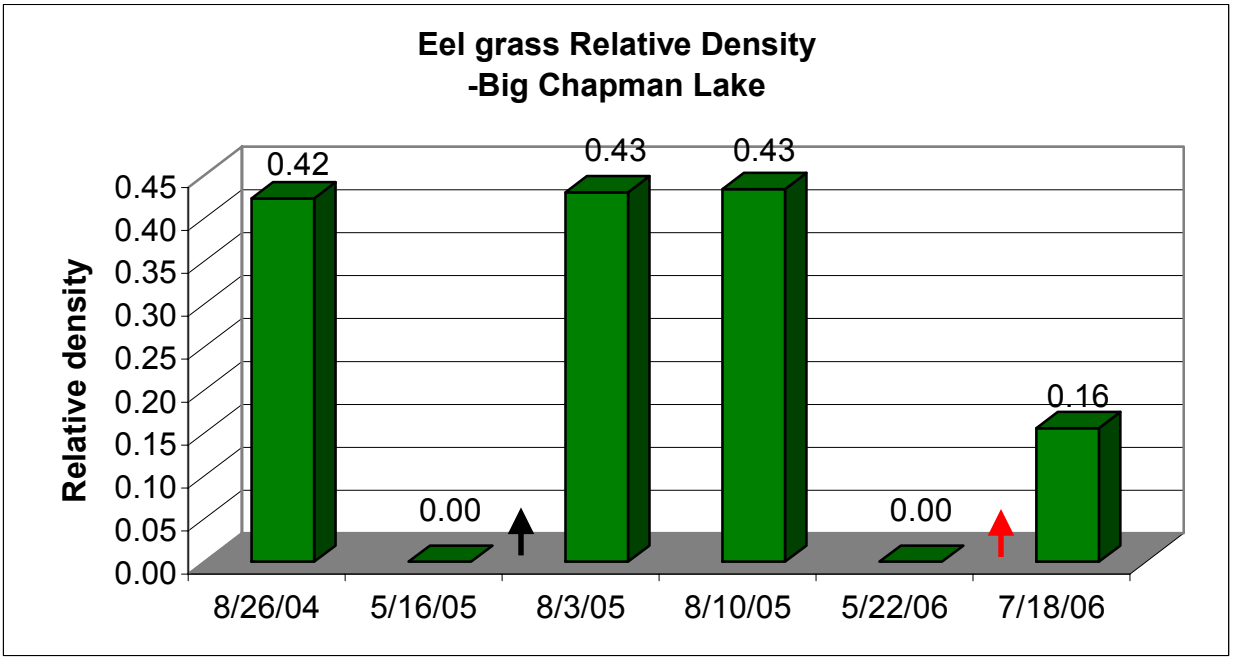



**Figure 12. Big Chapman eel grass relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

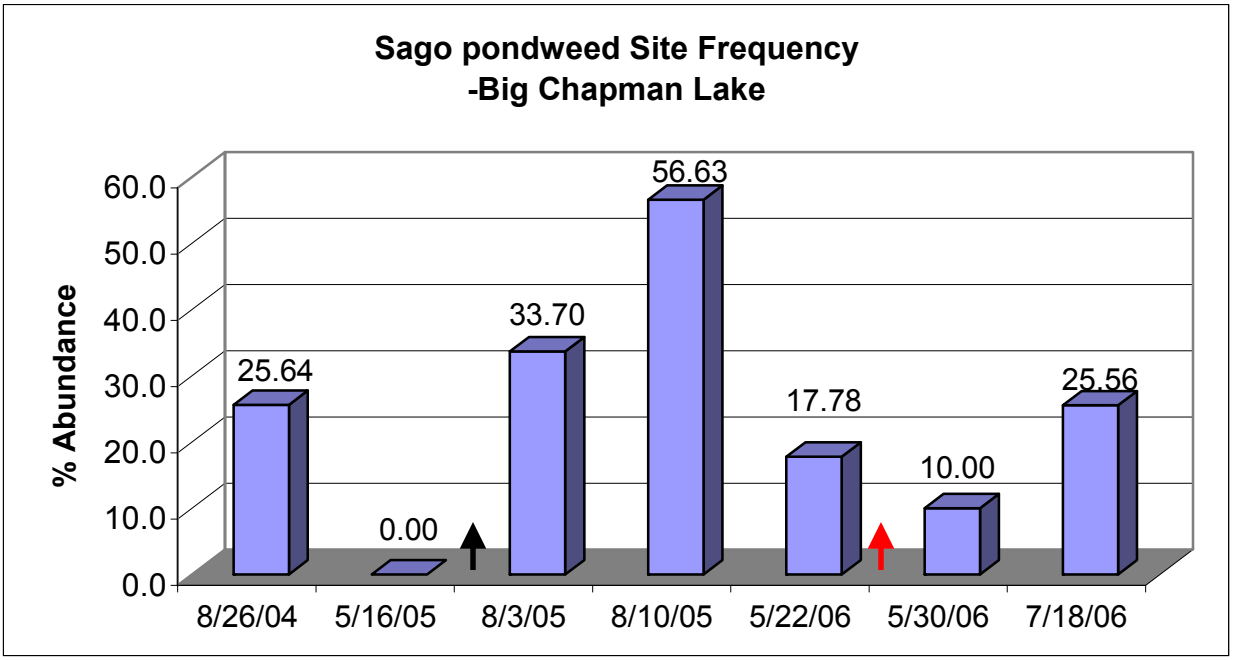



**Figure 13. Comparison of sago pondweed site frequency of occurrence at sites in the last three sampling seasons in Big Chapman Lake. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

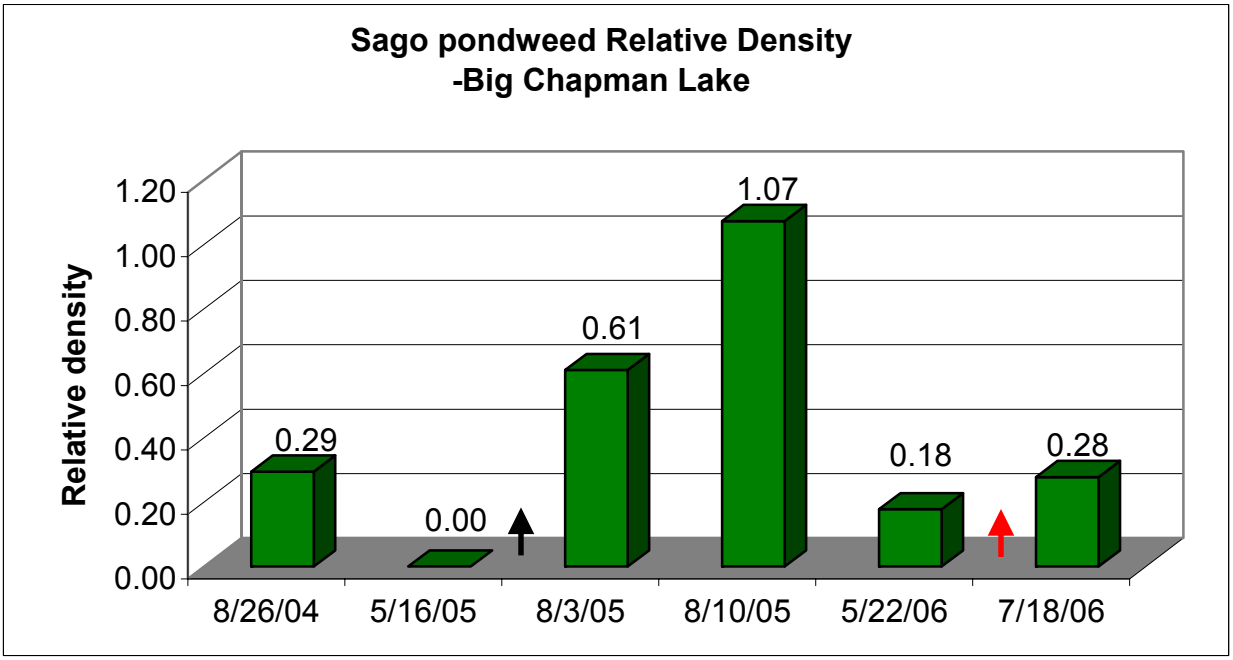



**Figure 14. Big Chapman sago pondweed relative density for the 2004, 2005 and 2006 sampling seasons. The red arrow indicates the LARE-funded aquatic plant herbicide treatment that targeted Eurasian watermilfoil and curly-leaf pondweed in 2006, while the black arrow indicates a similar LARE-funded treatment completed in 2005.**

# APPENDIX D:

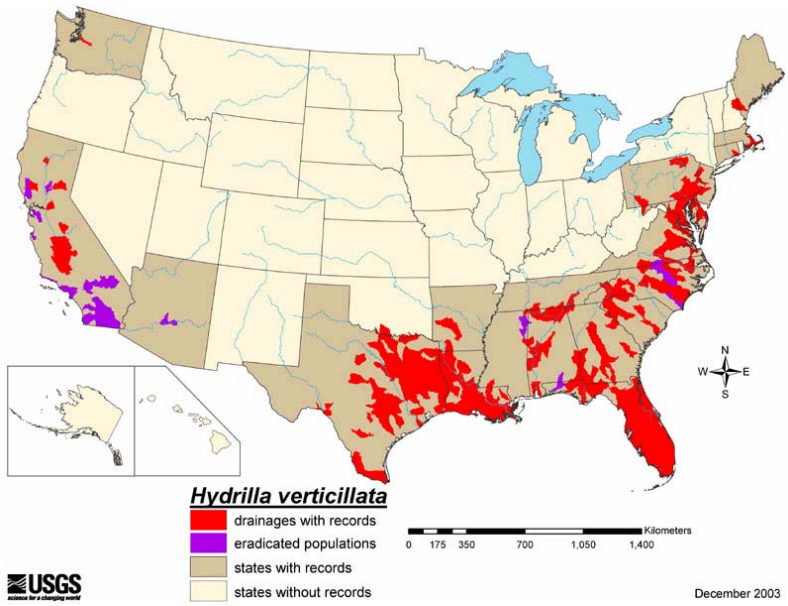
# HYRDILLA INFORMATION FOR DISTRIBUTION

# CHAPMAN LAKES
# AQUATIC PLANT MANAGEMENT PLAN UPDATE

# HYDRILLA

**COMMON NAME:** Hydrilla
Hydrilla is also known as water thyme, Florida elodea, Wasserquirl and Indian star-vine.

**SCIENTIFIC NAME:** *Hydrilla verticillata* (L.f.) Royle
Hydrilla's scientific name is made up of the Greek word "hydro" meaning "water" and the Latin word "verticillus" that means "the whorl of a spindle". Appropriately named, it is an aquatic plant with leaves that are whorled around the stem. Hydrilla is in the Frog's Bit family, or Hydrocharitaceae. It is the only species of the genus *Hydrilla* in the world though it resembles many of the other species in the family.



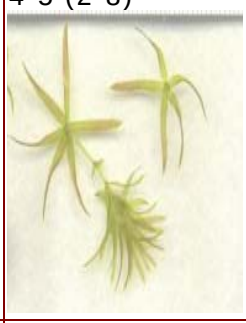

**DISTRIBUTION:** It is not really known where exactly hydrilla originated. Some sources give a broad native range of parts of Asia, Africa and Australia. Other sources are more specific and say that the dioecious form of hydrilla originated from the Indian subcontinent and the monoecious form originated from Korea. Currently the only continent without records of hydrilla is Antarctica.

**Indiana:** Hydrilla has not been detected in Indiana waters but it is on our Aquatic Nuisance Species watch list.

**DESCRIPTION:**

**Leaves:** Leaves are small about 2-4 mm wide and 6-20 mm long. They are strap-like with pointed tips and have visible saw-tooth margins. The leaves are whorled around the nodes in groups of 4-8 leaves. The leaf midvein is reddish in color and usually has a row of spines on it. This gives the plant a rough texture. The leaves are usually a green color, though topped out leaves could be bleached by the sun and appear more yellowish. Hydrilla has an axillary leaf scale called a squamula intravaginalis that is found next to the stem at the base of the leaf. This distinguishes it from the other species in the Hydrocharitaceae family. One may confuse hydrilla with another exotic weed, Brazilian elodea (*Egeria densa*). Hydrilla will have rough teeth on the underside of the leaves where Brazilian elodea will not. There is also a native species found in Indiana, American elodea (*Elodea canadensis*), which looks somewhat like hydrilla.

**Identification Characteristics of the Hydrocharataceae**

| Character | **Brazilian Elodea** *(Egeria densa)* | **American Elodea** *(Elodea canadensis)* | **Hydrilla (monoecious)** (*Hydrilla verticillata* | **Hydrilla (dioecious)** (*Hydrilla verticillata)* |
|---|---|---|---|---|
| **Leaves per Whorl** | 4 (3-5)  | 3(2)  | 5(2-8)  | 4-5 (2-8)  |
| **Serrated Edges Visible** | With magnification | With magnification | Distinct on older plants | Distinct |
| **Leaf Size** | Up to 4cm | Up to 1.5 cm | 1-2 cm | 1-2 cm |
| **Flowers** | Male only, up to 2 cm | Tiny, male and female on separate plants | Male and female on same plants, to 1 cm | Only female plants in US, to 1 cm |
| **Tubers Present** | No | No | Yes | Yes |

**Roots/Stem:** New root sprouts are white and when growing in highly organic soil they may be become brown. They are submerged and buried in the hydro-soil. Hydrilla stems are very slender only about 1/32 of an inch wide, but they can grow to lengths of 30 feet. When the stem nears the waters surface it branches out considerably. The monoecious form of hydrilla will usually start to branch out at the sediment level rather than at the top of the water.

**Flowers:** The flowers are imperfect (meaning there are separate male and female flowers) but the plant can be monoecious (flowers of both sexes on one plant) or dioecious (flowers of one

sex being produced per plant). The female flower is white with three petals that alternate with three whitish sepals. The male flower has petals and sepals similar to the female flower, but the color could be white, reddish, or brown.

**Fruits/Seeds:** Hydrilla produce two different hibernacula to cover its buds. One is called a tuber, which forms terminally on rhizomes. They can be 5-10 mm long and are off white to yellow colored. Hydrilla also produces a turions which are compact dormant buds in the leaf axil. They are 5-8 mm long, dark green in color, and they appear to be spiny. The turion will break off and settle to the bottom of the water to start a new plant. The tubers are able to over winter and re-sprout as new plants as well. Seeds are also produced.

**LIFE CYCLE BIOLOGY:** Hydrilla is a submersed, herbaceous, perennial aquatic plant. It is capable of living in many different freshwater habitats. It will grow in springs, lakes, marshes, ditches, rivers, or anywhere there is a few inches of water. Hydrilla can tolerate low nutrient and high nutrient conditions as well as a salinity of up to 7%. Another adaptation hydrilla possesses, that enable it to out compete native plants, is the ability to grow in low light conditions. It is able to grow at deeper depths and can begin to photosynthesize earlier in the morning than most other aquatic plants. In the beginning stages of life hydrilla elongates at a rate of one inch per day. This continues until the plant comes close to the top of the water, here it begins to branch out. It produces a large mat of vegetation at the waters surface intercepting the light before it can reach other plants.

Hydrilla can reproduce in four different ways, fragmentation, tubers, turions, and seed. Fragmented pieces of hydrilla that contain at least one node are capable of sprouting into a new plant. The tubers of hydrilla are formed on the rhizomes and each one can produce 6,000 new tubers. When out of water a tuber can remain viable for several days, it can even lie dormant for over 4 years in undisturbed soil before sprouting a new plant. Turions are formed in the leaf axils of the plant. They are broken off and once settled in the sediment they can sprout into a new plant. Uncharacteristic of most plants, seed production in hydrilla is of least importance for reproduction. It seems that seed production is mostly used for long distance dispersal by means of ingestion by birds. The monoecious form of hydrilla puts more energy into tuber and turion production than does the dioecious form. It is good to know which form you have to decide on the best management technique.

The main adaptations that give hydrilla an advantage over other native plants are: it can grow at low light intensities, it is better at absorbing carbon dioxide from the water, it is able to store nutrients for later use, it can tolerate a wide range of water quality conditions, and it can propagate in four different ways.

**PATHWAYS/HISTORY:** Under the name Indian star-vine, hydrilla was imported into Florida as an aquarium plant in the 1950's. A farmer living near Tampa acquired the plant but was not impressed with it and threw it out into a canal behind his business. A few months later the farmer noticed that the hydrilla grew very well and decided to market it. By the 1960's severe problems caused by hydrilla were being reported. In 1990 hydrilla could be found in 187 lakes and rivers in Florida. Because there are two different strains of hydrilla found in the United States, the monoecious strain and the dioecious strain, it is believed that there was a separate introduction outside of Florida. The dioecious form is mainly found in the southern states and California and the monoecious form is found north of South Carolina. Hydrilla was brought to

national attention in 1980 when it was discovered in the Potomac River in Washington D.C. Currently hydrilla is found in approximately 690 bodies of water within 190 drainage basins of 21 states.

**DISPERSAL/SPREAD:** Once established hydrilla can easily spread to new areas. Fragmented pieces of the plant are able to root and develop into a new plant. These plant fragments are transported to new waters via boats and fishing equipment. Hydrilla's tubers and turions allow it to persist in an area. They can live dormant in the ground and can even resist a drought. Waterfowl are a vector of transport for hydrilla as well. Some waterfowl feed on the plant and may regurgitate the tubers into other bodies of water. It has been found that these tubers are still able to sprout. Birds can also spread seeds. Hydrilla is still sold for aquarium use over the Internet, which could mean expansion of its range through more introductions, accidental or otherwise.

**RISKS/IMPACTS:** Hydrilla is sometimes called an invisible menace because most of the time you don't know it is there until it has filled the water. It will shade out native aquatic plants until they are eliminated. This forms a monoculture, which will reduce biodiversity and alter the ecosystem. Hydrilla does not only pose a threat to other plants but to animals as well. When hydrilla becomes over abundant, fish population imbalances are likely. The dense mats of hydrilla will alter the waters chemistry by raising pH, cause wide oxygen fluctuations, and increase water temperature.

Hydrilla is an economic drain. Millions of dollars are lost due to reduced recreational opportunities as hydrilla mats interfere with boating, swimming, fishing, etc. In flowing waters hydrilla will greatly reduce flow and can cause flooding. For operations that require water intake, hydrilla can pose a problem by clogging the intake pipes. Waterfront property values drop in areas infested with hydrilla. Millions of dollars are annually spent trying to control this aquatic pest.

**MANAGEMENT/PREVENTION:** Control of aquatic weeds is difficult and eradication sometimes can be an unrealistic goal. Before any type of management technique can be implemented there needs to be a positive identification of the plant. Some native plants look similar to hydrilla so it is important to have proper identification.

Hydrilla has not yet appeared in Indiana, however it is not far away. If this plant shows up in Indiana waters, it needs to be eliminated immediately. While there are many methods available to control aquatic plants, the method most suitable for complete and fast elimination is chemical control. Aquatic herbicides containing the active ingredient endothall, fluridone, or diquat are all labeled for use on hydrilla.

For states that have major infestations of this pest plant, they have looked to hydrilla's native range for any insects that could be used as a biological control. Four hydrilla-attacking insects have been released. *Bagous affinis*, a hydrilla tuber-attacking weevil and *Hydrellia pakistanae*, a leaf-mining fly both were released in 1987. *Hydrellia balciunasi* is another leaf mining fly that was released in 1989. *Bagous hydrillae*, a stem-mining weevil, was released in 1991. Many different states have released one or a combination of the four insects. It is still too early to know what long-term impacts these insects will have on hydrilla. One Indiana company is helping to develop a biological control method for hydrilla. SePro Inc. of Carmel, Indiana is a

cooperator in a project with U.S. Army Engineer Research and Development Center Environmental Laboratory to grow an endemic fungal pathogen that attacks hydrilla.

Hydrilla has been listed by the U.S. government as a Federal Noxious Weed. With this designation, it is illegal to import or sell the plant in the United States. However, it is likely that internet sales still occur.

Like all invasive species, the key to preventing their spread is knowledge! You can also help by practicing a few good techniques to stop the spread of hydrilla and other aquatic invasive plants.

- ✓ Rinse any mud and/or debris from equipment and wading gear and drain any water from boats before leaving a launch area.

- ✓ Remove all plant fragments from the boat, propeller, and boat trailer. The transportation of plant material on boats, trailers, and in livewells is the main introduction route to new lakes and rivers.

- ✓ Do not release aquarium or water garden plants into the wild, rather seal them in a plastic bag and dispose in the trash.

- ✓ Consider using plants native to Indiana in aquariums and water gardens.

- ✓ If you detect this plant in a lake, pond, or stream, immediately contact the Indiana Department of Natural Resources, Division of Fish and Wildlife.
    - (317)232-4080
    - dkeller@dnr.IN.gov
    - 402 W. Washington St., Rm W273
      Indianapolis, IN 46204

**REFERENCES:**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PHOTOGRAPHS compliments of the Washington Department of Ecology

Updated 3/05

# APPENDIX E:

# AQUATIC PLANT TREATMENT PERMITS

# CHAPMAN LAKES
# AQUATIC PLANT MANAGEMENT PLAN UPDATE

# APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)
Approved State Board of Accounts 1987

[ ] Whole Lake [x] Multiple Treatment Areas
Check type of permit

*INSTRUCTIONS: Please print or type information*

| FOR OFFICE USE ONLY |
|---|
| License No. |
| Date Issued |
| Lake County |

*Return to:*
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: $5.00

| Applicant's Name | Lake Assoc. Name | |
|---|---|---|
| Chapman Lakes Conservation Association | Chapman Lake Conservation Association | |
| Rural Route or Street: PO Box 776 | | Phone Number: 574-269-5654 |
| City and State: Warsaw, IN | | ZIP Code: 46580 |
| Certified Applicator (if applicable) | Company or Inc. Name | Certification Number |
| Rural Route or Street | | Phone Number |
| City and State | | ZIP Code |

| Lake (One application per lake) | Nearest Town | County |
|---|---|---|
| Big Chapman Lake | Warsaw | Kosciusko |
| Does water flow into a water supply | | [ ] Yes [X] No |

**Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.**

| | | |
|---|---|---|
| Treatment Area # 1 | LAT/LONG or UTM's: Treatment areas to be determined following May survey (see AVMP) | |
| Total acres to be controlled: <30 | Proposed shoreline treatment length (ft) | Perpendicular distance from shoreline (ft) |
| Maximum Depth of Treatment (ft) | Expected date(s) of treatment(s): mid to late May | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Spot treatment for Selective control of Eurasian watermilfoil using Renovate or 2,4-D

Plant survey method: [X] Rake [ ] Visual [ ] Other (specify) Data collected during 2006 Spring survey (JFNew)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Chara | | 35 |
| Eurasian watermilfoil | x | 20 |
| Nitella | | 10 |
| Grass-leaf pondweed | | 10 |
| Sago pondweed | | 10 |
| Eel grass | | 10 |
| Elodea | | 1 |
| Northern watermilfoil | | 1 |
| Spiny naiad | | 1 |
| Southern naiad | | 1 |
| Large-leaf pondweed | | 1 |
| | | |
| | | |

# APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)
Approved State Board of Accounts 1987

☐ Whole Lake ☒ Multiple Treatment Areas
Check type of permit

*INSTRUCTIONS: Please print or type information*

| FOR OFFICE USE ONLY |
|---|
| License No. |
| Date Issued |
| Lake County |

*Return to:*
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: $5.00

| Applicant's Name | Lake Assoc. Name | |
|---|---|---|
| Chapman Lakes Conservation Association | Chapman Lake Conservation Association | |
| Rural Route or Street: PO Box 776 | | Phone Number: 574-269-5654 |
| City and State: Warsaw, IN | | ZIP Code: 46580 |
| Certified Applicator (if applicable) | Company or Inc. Name | Certification Number |
| Rural Route or Street | | Phone Number |
| City and State | | ZIP Code |

| Lake (One application per lake) | Nearest Town | County |
|---|---|---|
| Big Chapman Lake | Warsaw | Kosciusko |
| Does water flow into a water supply | | ☐ Yes ☒ No |

**Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.**

| | | |
|---|---|---|
| Treatment Area # 2-5 | LAT/LONG or UTM's: Treatment areas to be determined following May survey (see AVMP) | |
| Total acres to be controlled | Proposed shoreline treatment length (ft) | Perpendicular distance from shoreline (ft) |
| Maximum Depth of Treatment (ft) | Expected date(s) of treatment(s): mid to late May | |

Treatment method: ☒ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Spot treatment for Selective control of Eurasian watermilfoil using Renovate or 2,4-D

Plant survey method: ☒ Rake ☐ Visual ☐ Other (specify) Data collected during 2006 Spring survey (JFNew)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Chara | | 25 |
| Common coontail | | 15 |
| Curlyleaf pondweed | | 15 |
| Eurasian watermilfoil | x | 15 |
| Sago pondweed | | 10 |
| Nitella | | 5 |
| Spiny naiad | | 5 |
| Elodea | | 5 |
| Common bladderwort | | 1 |
| Southern naiad | | 1 |
| Variable pondweed | | 1 |
| Illinois pondweed | | 1 |
| Northern watermilfoil | | 1 |

# APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)
Approved State Board of Accounts 1987

[ ] Whole Lake [x] Multiple Treatment Areas
Check type of permit

*INSTRUCTIONS: Please print or type information*

| FOR OFFICE USE ONLY |
|---|
| License No. |
| Date Issued |
| Lake County |

*Return to:*
DEPARTMENT OF NATURAL RESOURCES
Division of Fish and Wildlife
Commercial License Clerk
402 West Washington Street, Room W273
Indianapolis, IN 46204

FEE: $5.00

| Applicant's Name | Lake Assoc. Name | |
|---|---|---|
| Chapman Lakes Conservation Association | Chapman Lake Conservation Association | |
| Rural Route or Street: PO Box 776 | | Phone Number: 574-269-5654 |
| City and State: Warsaw, IN | | ZIP Code: 46580 |
| Certified Applicator (if applicable) | Company or Inc. Name | Certification Number |
| Rural Route or Street | | Phone Number |
| City and State | | ZIP Code |

| Lake (One application per lake) | Nearest Town | County |
|---|---|---|
| Big Chapman Lake | Warsaw | Kosciusko |
| Does water flow into a water supply | | [ ] Yes [X] No |

**Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.**

| | | |
|---|---|---|
| Treatment Area # 7 | LAT/LONG or UTM's: Treatment areas to be determined following May survey (see AVMP) | |
| Total acres to be controlled | Proposed shoreline treatment length (ft) | Perpendicular distance from shoreline (ft) |
| Maximum Depth of Treatment (ft) | Expected date(s) of treatment(s): mid to late May | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Spot treatment for Selective control of Eurasian watermilfoil using Renovate or 2,4-D

Plant survey method: [X] Rake [ ] Visual [ ] Other (specify) Data collected during 2006 Spring survey (JFNew)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Chara | | 35 |
| Spiny naiad | | 15 |
| Sago pondweed | | 15 |
| Eurasian watermilfoil | x | 15 |
| Grass-leaf pondweed | | 5 |
| Illinois pondweed | | 5 |
| Flat-stem pondweed | | 5 |
| Eel grass | | 5 |
| | | |
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| Treatment Area # | LAT/LONG or UTM's | |
|---|---|---|
| Total acres to be controlled | Proposed shoreline treatment length (ft) | Perpendicular distance from shoreline (ft) |
| Maximum Depth of Treatment (ft) | Expected date(s) of treatment(s) | |

Treatment method: ☐ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. _____

Plant survey method: ☐ Rake ☐ Visual ☐ Other (specify) _____

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
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*INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.*

| Applicant Signature | Date |
|---|---|
| Certified Applicant's Signature | Date |

**FOR OFFICE ONLY**

| | |
|---|---|
| ☐ Approved ☐ Disapproved | Fisheries Staff Specialist |
| ☐ Approved ☐ Disapproved | Environmental Staff Specialist |

Mail check or money order in the amount of $5.00 to:

**DEPARTMENT OF NATURAL RESOURCES**
DIVISION OF FISH AND WILDLIFE
COMMERCIAL LICENSE CLERK
402 WEST WASHINGTON STREET ROOM W273
INDIANAPOLIS, IN 46204

# APPLICATION FOR AQUATIC VEGETATION CONTROL PERMIT

State Form 26727 (R / 11-03)
Approved State Board of Accounts 1987

[ ] Whole Lake [X] Multiple Treatment Areas
Check type of permit

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402 West Washington Street, Room W273
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FEE: $5.00

| Applicant's Name | Lake Assoc. Name | |
|---|---|---|
| Chapman Lakes Conservation Association | Chapman Lake Conservation Association | |
| Rural Route or Street: PO Box 776 | | Phone Number: 574-269-5654 |
| City and State: Warsaw, IN | | ZIP Code: 46580 |
| Certified Applicator (if applicable) | Company or Inc. Name | Certification Number |
| Rural Route or Street | | Phone Number |
| City and State | | ZIP Code |

| Lake (One application per lake) | Nearest Town | County |
|---|---|---|
| Little Chapman Lake | Warsaw | Kosciusko |
| Does water flow into a water supply | | [ ] Yes [X] No |

**Please complete one section for *EACH* treatment area. Attach lake map showing treatment area and denote location of any water supply intake.**

| | | |
|---|---|---|
| Treatment Area # 1 (labeled 6) | LAT/LONG or UTM's: Treatment areas to be determined following May survey (see AVMP) | |
| Total acres to be controlled: <10 | Proposed shoreline treatment length (ft) | Perpendicular distance from shoreline (ft) |
| Maximum Depth of Treatment (ft) | Expected date(s) of treatment(s): mid to late May | |

Treatment method: [X] Chemical [ ] Physical [ ] Biological Control [ ] Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. Spot treatment for Selective control of Eurasian watermilfoil using Renovate or 2,4-D

Plant survey method: [X] Rake [ ] Visual [ ] Other (specify) Data collected during 2006 Spring survey (JFNew)

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| Common coontail | | 25 |
| Northern watermilfoil | | 20 |
| Eurasian watermilfoil | x | 20 |
| Curlyleaf pondweed | | 15 |
| Sago pondweed | | 10 |
| Chara | | 6 |
| Variable pondweed | | 1 |
| Southern naiad | | 1 |
| Small pondweed | | 1 |
| Eel grass | | 1 |
| | | |
| | | |
| | | |

| Treatment Area # | LAT/LONG or UTM's | |
|---|---|---|
| Total acres to be controlled | Proposed shoreline treatment length (ft) | Perpendicular distance from shoreline (ft) |
| Maximum Depth of Treatment (ft) | Expected date(s) of treatment(s) | |

Treatment method: ☐ Chemical ☐ Physical ☐ Biological Control ☐ Mechanical

Based on treatment method, describe chemical used, method of physical or mechanical control and disposal area, or the species and stocking rate for biological control. _____

Plant survey method: ☐ Rake ☐ Visual ☐ Other (specify) _____

| Aquatic Plant Name | Check if Target Species | Relative Abundance % of Community |
|---|---|---|
| | | |
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*INSTRUCTIONS: Whoever treats the lake fills in "Applicant's Signature" unless they are a professional. If they are a professional company who specializes in lake treatment, they should sign on the "Certified Applicant" line.*

| Applicant Signature | Date |
|---|---|
| Certified Applicant's Signature | Date |

**FOR OFFICE ONLY**

| | |
|---|---|
| ☐ Approved ☐ Disapproved | Fisheries Staff Specialist |
| ☐ Approved ☐ Disapproved | Environmental Staff Specialist |

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